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OURSELVES.

IN presenting the first number of the Journal of the Mysore Agricultural and Experimental Union to the public, we beg leave to set forth in accordance with time-honored custom a few facts about "Ourselves." It is a most gratifying feature of the present day condition of our State that Agriculture is claiming a great deal of public attention. Thus in the programme of the Government the increase of Agricultural production occupies one of the foremost places; the State Department of Agriculture is growing fast and its activities continue to ramify widely; fresh developments are already in contemplation; the local school of agriculture is yearly sending out a steady though small number of trained men who are sure to leaven up the routine of rural life and infuse new ideas into our age-long agriculture; the number of people who come into touch with the Department is steadily on the increase and there is on all sides a most welcome sign of awakening in agricultural matters. It was therefore felt that an organisation which would bring together all these different types of men and agencies interested in the improvement of agriculture and create a bond of union amongst them would serve a very

useful purpose. The Mysore Agricultural and Experimental Union has been the result and the *raison d'etre* of the Union applies equally well to its Journal, which for the present at least will be the outward and visible symbol of its existence.

The aims and objects of the Union are set forth elsewhere in this Journal. Here we may indicate the nature of the record that the Journal is proposed to be.

A considerable portion will be devoted to a record of the work carried on by our members of which it is expected as time goes on there will be a large bulk. For one of the chief lines of work in which members will engage themselves is the conducting of accurate trials of one or other of the various recommendations of the Agricultural Department. It is hardly necessary to point out how great is the need for such trials in any scheme for the popularisation of improvements. Between the results of experimental work in the field or the laboratory of the scientific staff of the Department and their transference on to the ryots' fields an intermediate stage where they may be tried on a field scale under proper control with a correct numerical record of the conditions and results by men who cannot only appreciate and assess disturbing factors at their proper value, but will also possess the enthusiasm needed for such work, will be a very great advantage. Where can we find the agency for carrying on such work if not in the members of such a Union ?

Again as every one knows there is nothing so striking in the agriculture of the State as the diversity of its conditions, methods, implements and crops, so much so that one of the most promising lines of work will be the popularisation of the excellent practices known in certain areas in others where they may be unknown. There is hardly one amongst us, not even the 'mossbacks' who can claim to an exhaustive knowledge of this wealth of agricultural practices. It is hoped that the Journal will furnish the medium through which a large body of this knowledge may be made known, so that if need be they may form the starting points of critical studies.

The business side of farming again has as yet received very little attention or study. It is nevertheless a most important and profitable line of investigation. The large absentee landlord, the

tenant farmer either himself farming the whole of his land, or subletting part, the part owner, part tenant, the mere wage earners of different degrees of standing; what do these men make out of their business? The different types of farming, arable farming, animal husbandry, the plantations, the dry, wet and garden crop farming, how do these stand as profit earning propositions? Our members have a practically unexplored field for inquiry and study, which with the thoroughness and accuracy they may bring to bear on it will reveal the scope there may be for improvement and expansion.

Not the least important of the functions of the Journal will be the creation of what may be called the "eyes and ears" of the Agricultural Department in the districts, that is, a band of men who will be able to give correct accounts of the outturns of crops, seasonal conditions as related to the outturn, crop pests, cattle epidemics and so on, who will supervise minor experiments, and in fact help to keep the Department in close touch with local conditions. The Journal will be able to summarise reports and action taken on various lines.

Scientific contributions from the departmental staff and "Selections" from other Agricultural Journals of interest to members will form regular features of the Journal.

It will also be our aim to draw attention to the farms and farming methods of some of our successful farmers in the State. Such accounts cannot fail to be of great interest and if only they demonstrate how business capacity and shrewdness are factors tending to success in agriculture as in other walks of life they would serve a useful purpose. There are many such worthy men in our midst and though they may not possess or desire the outward stamp that distinguishes a man of importance in these days, yet they are real gold for all that and would form fit objects of study to our rising generation of scientific farmers.

Though concerned mainly with the agriculture of our own State, we realise at the same time that we are only a unit among the several agencies at work for the improvement of Indian Agriculture generally. We shall therefore always seek both the criticism and the helpful advice of eminent workers outside our State. We acknowledge with grateful thanks the help we

have already received and the kind words of encouragement which most of the gentlemen we approached have addressed to us. Our special thanks are due to Mr. J. Mackenna, M.A., I.C.S., C.I.E., Agricultural Advisor to the Government of India, for having testified his appreciation of our new attempt by contributing the article on "Seed and Seed Farms" which occupies the place of honour in our opening number.

It only remains now to say God-speed to the Journal of the Agricultural and Experimental Union, and to wish it a long career of usefulness. In doing so with the greatest pleasure we would beg to express the assurance that no pains will be spared on our part to make it worthy of the high aims we have placed before ourselves.

SEED AND SEED FARMS

BY

J. Mackenna, C.I.E., I.C.S.,

Agricultural Adviser to the Government of India.

ONE of the most striking characters in Indian crops, grown for centuries under the same conditions, is the enormous extent of admixture of varieties in almost every field and perhaps no part of the world offers a finer field for investigation to the Economic Botanist. In this country where a well-bred animal or plant is rare and soon begins to degenerate and where the evil of sowing mixed seed is so rampant, the question of production, maintenance and supply of pure seed of an improved plant is of the utmost concern. In Europe and America intelligent farmers do a lot of work in this line. Besides these are the well know firms of Sutton, Garton, Henderson and others of high repute who are both plant breeders and seed suppliers and whose names are a guarantee of reliability. In India this duty devolves on the Agricultural Department. The first work is to separate types from the prevailing mixtures and evolve an improved variety. The scond stage is to introduce it into general cultivation and to maintain the quality. For this pur-

pose seed farms are necessary. It is most essential that a continuous flow of improved seeds should emanate from the central seed farm so as to establish the crop on a firm basis in one locality.

If the Botanist improves a plant both in respect of yield and quality and the Deputy Director of Agriculture spreads it far afield among the cultivators in his Province, the Department can be said to have introduced a valuable improvement which costs the cultivator nothing. As a rule capital is required with which to buy a new reaper or to purchase artificial manures or a whole monsoon crop has sometimes to be sacrificed in order to make room for the application of green manuring; but in the introduction of an improved variety practically no increased expenditure is required on the part of the cultivator beyond the nominal charge for the improved seed. In India the mere separation of types has led to great agricultural progress and the Departments are exploiting this line of work for all it is worth. Improvement of a crop by breeding varieties combining desirable characters from two or more varieties is a much more laborious and costly process as has been proved by the work of the Howards at Pusa but it is most essential that such work should be undertaken at properly equipped centres by officers devoting their whole attention to this work; otherwise when the improvements based on mere selection are adopted by the cultivators the Department will have nothing further to offer by way of demonstration.

The question resolves itself into (1) how the improvement of crops is to be attempted, (2) how the quality of improved seed produced is to be maintained, and (3) what arrangements should be made for their supply to cultivators. All the work of botanists and agriculturists in the improvement of crops will be in vain if practical means for supplying pure seed and maintaining its purity are not devised and organised.

Since the foundation of the Agricultural Departments in this country in 1905 a considerable amount of attention has been paid to the improvement of the cultivated plants of the country. New crops have been introduced and better varieties of existing staples have been brought to the notice of the people,

coupled often with improved methods of cultivation. The success of these efforts has in turn raised the question of the best means of maintaining and distributing pure seed of improved varieties of crops. The subject was considered by the Board of Agriculture at its meeting held in 1911 and a special sub-committee under the chairmanship of Mr. Howard was appointed to deal with it. The report of that committee contains many useful suggestions and I would recommend every one interested in plant-breeding work or in the work of distributing improved seed to go carefully throught it. *

The general aim to be kept in view is the replacement wherever possible of the existing mixtures by pure types characterised by increased yield and by improved quality. As regards methods of obtaining improved varieties it would be well to emphasise at the outset the necessity of basing all work in this direction on the study of the methods of pollination of the various crops investigated. It is especially necessary in the case of plants which cross-fertilize that this preliminary work should be undertaken, otherwise much time and energy will be wasted in selection experiments and variety trials which cannot possibly yield any useful result. It is desirable further that this preliminary work should be conducted in the tract concerned as several cases have been observed in which climate has considerably modified the usual pollination mechanism, e.g., it has been observed by the Howards that natural crossing in wheat is much more frequent at Lyallpur than at Pusa.

In the case of self-fertilized crops the comparison of the progeny of single selected plants might easily result in the production of the desired improvement. In this case all that is necessary is to multiply the type and begin the work of seed distribution. In the case of plants which cross-fertilize the procedure is not so simple and special measures are necessary to avoid the consequences of vicinism.

In introducing varieties of crops from other tracts or countries it is necessary to study the constitution of the crop and possibly to apply methods of selection. The immediate dis-

* See *Proceedings of the Board of Agriculture in India*, 1911. Also see *Agri. Jour., India, April* 1912.

tribution of imported seed is undesirable, owing to the possible prevalence of inferior types. Neglect of these precautions in the past probably accounts for the want of results in introducing exotic cottons into India. If the desired improvement cannot be obtained by selection, it may be necessary to cross suitable types and to evolve a new form combining the special characters desired. Work on the above lines should result in the production of a stable agricultural type which alone should form the basis of future seed distribution.

In the testing of varieties of crops which cross-fertilize there are special difficulties to be overcome. The seed of different varieties grown side by side cannot be employed for the production of pure seed. For the same reason variety trials should not be conducted on seed farms unless special precautions are taken to isolate the plots from which the pure seed will be derived. As regards the maintenance of pure types, the botanist in each Province should maintain a collection of the improved types introduced into general cultivation by the local department. This collection will serve as a source from which pure seed can be obtained whenever it should be necessary to restock the seed farms.

The main principles which should guide the work of the Agricultural Department in the growth and distribution of seed to cultivators in India have been laid down by the Board of Agriculture in India, as follows:—

(1) The desirability of concentrating the efforts of the Department on one or two well defined problems at a time rather than wasting its resources on indiscriminate seed distribution.

(2) The desirability confining the work of seed distribution in any one tract as far as possible to one sort and of systematically replacing existing mixtures by this pure type. This is particularly necessary in the case of cross-fertilized plants where degeneration through vicinism is of such great importance. The distribution of one sort has the further advantage of creating large supplies of one particular type and thus forming a trade centre for this produce and attracting buyers.

(3) The necessity of utilizing to the utmost the present staff and resources of the Department and of supplementing this

by enlisting the assistance of leading agriculturists in the work of seed growing and seed distribution in the tracts concerned.

Seed distribution will thus naturally start from a central farm and gradually spread outwards. The assistance of the best farmers should therefore be enlisted, the seed fully charged for and the work conducted in tracts where markets already exist for the produce. Botanical control of the central seed farms is very necessary. These should be visited by the botanists whenever possible. Great care is required in seed growing both as regards seed cultivation and also as regards contamination from such sources as the seed of a previous crop, the dung of animals, irrigation water and the like.

The question of marketing the produce is of considerable importance in the work of seed distribution and specially where distinctly improved crops are being grown. In the beginning it is not always possible for the people to get the real value of their produce and for the improvements to be fully recognised by the trade. It is most advisable to send the improved product to the best market and sell for several years there sufficiently large consignments of the produce. In carrying out experiments of this nature, however, three points must be remembered :—

(1) That a single consignment in a large market or exchange is unlikely to attract much notice unless special attention is drawn to it.

(2) That single occasional consignments do not fetch the same price as the produce of recognised value known to be regularly obtainable in large quantities.

(3) That as in the future the marketing of the produce must be in the hands of the local buyers and agents, it is advisable where possible to enlist their help and carry on this work with their co-operation.

Having enunciated the general principles which should govern the improvement of crops, the production of seed and the best principles for preserving the purity of the seed and organising the supply, we now come to the results already obtained from such work in the provinces. The success attained has been most gratifying particularly in the two crops,

cotton and wheat, which have been the subjects of serious study at the hands of the officers of the Department.

The distribution of improved seed of a crop like cotton (in which natural cross-fertilization is common), in such a manner that the improvement in the staple can be maintained permanently, is a problem of the greatest interest in agricultural science. If this work is to be of lasting benefit to India the present cottons in any particular tract must be entirely replaced by one kind which breeds true to type in order that the results of vicinism may be prevented and the mixing of seed at the ginneries rendered impossible. During the preliminary breeding and selection operations it is necessary to protect the flowers from foreign pollen and to work entirely with self-fertilised seed This circumstance adds greatly to the labour involved in the work and also entails as a preliminary the isolation of pure lines from the mass of splitting forms (which make up the bulk of the cotton crop of India) before crossing can be begun*. Further, an improved type will have to be grown separately and every care taken to keep the seed supply pure and to prevent any degeneration taking place as a result of vicinism. It is now generally recognised that the degeneration which results when improved cottons are introduced into a new country is largely a result of vicinism. The exotics in the first place are often a mixture of types which cross among each other while further degeneration results from the admixture crossing with local sorts. It is more than probable that the want of success in introducing foreign cottons into India in the past has been mainly due to natural cross-fertilisation.

Mr. Clouston's work in connection with *roseum* in Berar is of great interest as showing that where the improvement aimed at is only one of yield and not of quality, the system introduced by him of supplying the seed is probably the best. Mr. Clouston separated this type from the so-called Jari mixture generally grown by the cultivators. It may be mentioned that *roseum* is a short staple cotton characterised under ordinary conditions by high yield, high ginning percentage and robust growth and it pays

* See the sections on Economic Botany in the *Annual Reports of the Board of Scientific Advice in India*, 1911-12, 1912-13, 1913-14, 1914-15.

the cultivator to grow it. From the Akola farm as a centre the system of seed distribution has been developed by Mr. Clouston* on the following lines :—

Leading landowners who were also members of agricultural associations were selected as suitable men to look after the local private seed farms and at the beginning the Government guaranteed to these men to make up any loss resulting from the improved methods of cultivation and the growth of seed which the Agricultural Department recommended. The selected seed from the Akola farm was sold to these private seed farms and the owners themselves arranged for its sale and distribution. The supervision of the Agricultural Department was confined to cultivation, ginning and advertising the seed in their monthly vernacular journals. The work has been considerably simplified. by the formation of agricultural unions the members of which grow only *Roseum*. These members obtain their seed from the union central farm which is supplied from the Government farm The unions provide small ginning plants driven by an oil engine and for this the Government sometimes advance a loan of Rs. 2,000. The success of this line of work has been so striking that the number of seed farms in Berar in the year 1916-17 was 513, the number of registered and unregistered unions 51 and the amount of seed sold was sufficient to sow over 800,000 acres resulting in an added profit to the cultivators of over 120 lakhs of rupees. †,‡.

It would be well to point out that in the Central Provinces the question was very simple as it was concerned with an increase in the yield only. A certain amount of natural crossing which usually takes place is not so important here as in the case of distribution of *karunganni* in Tinnevelly, of Cambodia in South Madras or of improved Broach in Gujarat. In all these latter, quality of the fibre is the main consideration.

The problem of establishing a variety characterized by an improved staple is much more difficult than that in which a

*See *Agricultural Journal of India*, Vol. VI, pp. 361—63; also Vol. X, pp. 150-51.

† See *Agricultural Journal of India*, Special Indian Science Congress Number, 1917, p. 32.

‡ *Report on the Progress of Agriculture in India*, 1916-17, p. 24.

higher yield is the main feature. This will be exemplified from the work of the Madras Department in connection with Tinnevelly cotton, a lucid account of which is given in Mr. Sampson's article on " Recent History of the Cotton Improvement Work in Tinnevelly and Ramnad Districts " in the April (1912) issue of the *Agricultural Journal of India*.

The efforts to improve the cotton crop in the area where Tinnevelly is grown commenced in 1905 when a detailed survey of the area was begun. In the north of the tract the *uppam* variety was found to predominate while in the south the variety *Karunganni* was held in greatest esteem. There was however a good deal of admixture of these two forms all through this region. The best villages were those which preferred to handgin the *kapas* and to sell their lint while the worst were those which sold all their *kapas* and depended on outsiders for their seed. At first an effort was made to distribute improved seed of both these varieties, *uppam* in the north and *karunganni* in the south but experience showed too much was being attempted with the means available and it was decided to restrict the work to the southern half of the tract and to improve the *karunganni*. The operations were started at the Koilpatti farm and in a short time seed sufficient to sow 10,000 to 12,000 acres of pure *karunganni* each year was distributed. This naturally had a considerable effect on the quality of the cotton. New ginning factories were put up by cotton buying firms in the tract, mainly on account of the superiority of the crop. These factories combined with two or three seasons of short crop were found to have undone the work of the department in keeping the crop pure. In the words of Mr. Sampson " In 1912 it was found that what a year or two previously had been practically a pure karunganni tract was again a hopeless mixture of bazar seed. Although ginning factories under proper management do much to maintain the quality of export cotton by having the ginning under control, their introduction tells very seriously on the quality of the seed sold for sowing. Village dealers instead of ginning the village *kapas* by hand and selling the lint now dispose of the *kapas* to travelling dealers who deal directly through the brokers employed by the factory. Consequently all

kapas whether good or bad is mixed, bad samples graded up with good, *kapas* which will not pass muster is similaily graded up till it does. The crops in the neighbourhood of these factories further showed that much of the seed had been brought from a distance. *Kapas* instead of being stored dry, as formerly, is now often collected straight from the field and packed immediately into *borahs*. The result is that much of the cotton heats and the vitality of the seed is either weakened or altogether destroyed." In 1912-13 the work was therefore started afresh with improved selections obtained from the local crop and efforts were made to control the seed supply and to concentrate the improved cotton in certain villages. The new types now distributed are a great improvement on the country crop both in yield and quality. In 1916 some 56,000 acres were sown with the departmental seed of selected Tinnies. The system of joint sales and ginning has been expanded and regular seed unions working under rules have been formed. The aim of the department is to spread a net-work of these Unions over the whole Tinny tract so that the bulk of the seed required may be supplied by these Unions.*

It will thus be seen that the chief difficulties with regard to the improvement of Indian cotton particularly where quality is concerned, arise *after* a better cotton has been obtained at the experiment stations. The seed distribution should be concentrated in a comparatively small area at first and arrangements should be made for separate ginning. It is necessary to maintain effective supervision with a view to prevent adulteration. Official assistance in marketing the superior produce may be given at first but later on co-operative sale by the growers themselves should be encouraged. Only when the new kind is completely established should the Agricultural Department transfer its operations to another tract.

The difficulty met with in spreading a type of cotton of improved fibre is well exemplified in the case of Cambodia in Madras. The rapidity with which it spread, the part the private agency had in the matter and the fact that most of the seed supply was not controlled by the Department points a lesson to all connected with the establishment of high quality cotton in

* See the Report of the Department of Agriculture, Madras, for 1916-17.

India. To bring about any permanent improvement it is necessary to replace systematically all the existing cottons in a tract by one type. This replacement to be effective must be controlled by the Agricultural Department. There must always be a risk of fraudulent adulteration of seed if the seed supply is not under strict control and hence it is preferable to work in one or two districts at a time rather than to allow the cotton to spread itself. Only in this way can the consequences of natural crossing, of mixing of seed by ginneries, and of fraudulent admixture be prevented.

In the case of wheat in which self-fertilization is the rule, the question of seed distribution does not present the same difficulties as have to be overcome in the case of cotton. It is only in the irrigated tracts like the Punjab where the air is dry that natural cross-fertilization in wheat is of sufficient importance to be considered in the work of seed distribution. Admixture of kinds in wheat at threshing time can be to a great extent prevented by using a seperate threshing floor for each kind or by the use of pucca floors. Even when admixture takes place the cultures can be started afresh from a single plant and a large quantity of pure seed is very soon obtained. Further, the amount of seed per acre in wheat is relatively large so that the area of the seed farms is not so large as in the case of cotton. The only problem in wheat distribution in India after the best wheats for any tract have been obtained is the question of grades. The establishment of such grades as those of the Canadian wheats is most necessary in order to win the confidence of the trade and to adequately remunerate the cultivators. To bring this about it will be necessary to confine the seed distribution in the various tracts to wheats of one or two grades and to replace the existing crops by these grades.* The distribution of Pusa wheats is proceeding on these principles and already considerable areas in Bihar and the Central and Eastern Circles of the United Provinces grow these wheats. In the Northern Circle of the Central Provinces where also considerable work has been done in connection with the testing and introduction of

*Howard, A. *Report of the Board of Scientific Advice in India*, 1911-12, pp. 194-95.

improved varieties of wheat Mr. G. Evans found it necessary to organize seed-farms. These are described in his article in the *Agricultural Journal of India*, July 1913, to which reference may be made by those interested in the subject.

I think the examples I have given are sufficient to illustrate the difficulties in running the seed-farms, the principles on which they should be conducted and the amount of good they are capable of doing in ameliorating the material condition of the cultivators. These principles have now been thoroughly grasped by the Departments and the success which is now attending the efforts to push the cultivation of Pusa wheats over most areas of India, of American cotton in the Punjab, of selected wheats in the Northern parts of the Central Provinces, of the selected variety of rice known as Indrasail in Bengal, to name only a few, are a happy augury of the future development of the greatest industry in this country.

The Value of Economic Statistics in India*

BY

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THE search for knowledge is carried on under the influence of various motives. So far as economic knowledge is concerned I notice three main objects with which it is pursued both in India and elsewhere. There is one class of enquirers who search for economic information with the idea that sticks are required to beat dogs with. These are the controversialists, who want to get hold of facts, or reputed facts, in order to make a point for or against the Government. With these I have at present nothing to do. There is a second class of enquirers who are animated by a scientific spirit, by a love of truth for its own sake, irrespective of any use which may be made of it. With these also I have at present nothing to do. I assume that you who are here present belong to a third class of enquirers, those who desire to acquire economic truth because of its value as a guide to action.

* A lecture delivered at the All India Agricultural and Industrial Exhibition, Mysore, October 1918.

The gathering of statistics is an important part of the pursuit of economic truth. Assuming therefore that you belong to the third class of enquirers, the manner in which you will initiate statistical enquiries will depend upon the sort of use to which you mean to put the knowledge when obtained.

The gathering of statistics may be, to a certain extent, the work of private individuals; but the power of individuals in this respect are very limited, especially in India. We have no Indian statisticians who have done work on anything like the scale of the investigations of Mr. Charles Booth and Mr. Seebohm Rowntree. It is true that we have had very creditable efforts in these directions, but the conditions in India are such that the amount of investigation so carried on has necessarily been small. Hence statistical enquiry becomes a function of Government. It follows therefore that the policy which we should advocate with regard to the State collection of Statistics depends upon the general policy which we advocate with regard to the relations between the State and the economic life of the country.

You are all no doubt familiar with the *laissez faire* doctrine, the adherents of which look upon almost any form of State intervention in the economic life of the people with a sort of holy horror. This doctrine partakes rather of the nature of a religious dogma than of a scientific theory. It originated in France, being a deduction from the doctrine of Pre-established Harmony, a theory with regard to the ultimate facts of the universe, which was at the time very fashionable, but which has few if any advocates at the present day. It was transported to England by Adam Smith, with results somewhat similar to those of the transportation of the comparatively harmless rabbit of the British Isles into Australia, where it found a congenial environment and grew and multiplied into a serious pest. There were many reasons why the *laissez faire* doctrine found a congenial home in England in the end of the eighteenth and first half of the nineteenth century. There was very rapid transformation of industrial conditions, and the active business men who were equipping English industries with new machinery, and revolutionising business methods, and making great fortunes for themselves in the process, objected very strongly to being interfered

with by any Governmental regulation, whether based on ancient law and customs, or prompted by concern for the labourer who was frequently exploited and oppressed, or for the consumer who was frequently swindled by adulterated goods. Many professed economists, as for example Nassau Senior, made themselves spokesmen of the capitalist class. In the second place, the character of the administrative machinery was such as to cause the ordinary man who had no special interests to serve, to look with distrust upon any Governmental activity that could possibly be avoided. The reason of this was that Government offices were recruited by political nomination, and controlled by the party system. Hence a man with two sons and some political influence might secure a Government office for one son who was lazy and stupid and entirely lacking in initiative and self-reliance, he would allow another son who was able and industrious to go into private business in which his talents would have free scope. There was in fact a system of selection of the most incompetent for the Government offices, and it is no wonder therefore that the friends and relatives of Governmental officials became steady believers in the doctrine of *laissez faire*. We have got rid of that bad system, but the inference drawn from it persists.

Ultimately the doctrine of *laissez faire* was transported to India; notably by Lord Morley, who more or less suppressed the Madras Department of Industries, and caused the retirement of one of our men of genius, Mr. Alfred Chatterton, a fact of which you are all very well aware, since Madras's loss was Mysore's gain. It is said that good Americans when they die go to Paris; I note that English economic fallacies when they are found out in England, come to India, and though a theory may be dead and buried there, its ghost may start a fresh career of mischief here. So it was with the doctrine of *laissez faire*.

Fortunately this doctrine did not, in coming out to India, find a congenial environment. The attitude of the Indian mind, if we can draw inferences from certain customs surviving from ancient times, has always been of an opposite tendency. Here at Dasara we are reminded that one of the ancient duties of an Indian Raja or Maharaja has from time immemorial been to be decorated with great abundance and variety of jewels. It would

be a great mistake to suppose that the object of this is the personal gratification of the Raja himself, or of the ladies of his household. We know, through the investigations of Sir J. G. Frazer and through other sources, that precious stones, and also gold and silver, have magical properties, each variety conferring upon the wearer its special benefit and advantage, such as health, strength, immunity to some disease, good fortune, and the like. The Raja acquires these advantages. But the Raja himself is a magical representative of the whole State and the community over which he reigns. Therefore all these desirable attributes which are bestowed by the jewels upon the Raja are also bestowed upon the people. There can therefore be little doubt that the ancient Hindu belief is that it is a business of the Government to do anything whatsoever that may appear to be likely to further the economic well-being of the people.

Nor do I see any change in the present day attitude of the Indian mind. If anything I should say that Indian thinkers are apt to go too far in their repudiation of the exaggerated doctrine of *laissez faire* as it was current some 60 or 70 years ago in England, the truth it appears to me is in these questions somewhere in the middle. I think we can safely concede to the advocates of the *laissez faire* doctrine that the burden of proof rests upon those who advocate any particular intervention of the State. The State should leave well alone; and even when things are not altogether well, if there is a good hope that an effective remedy can be found by the voluntary exertions of individuals and associations, it is better for the State to confine itself to removing any unnecessary obstacles that may obstruct such voluntary action, rather than take on the work itself. But as soon as a careful review of the situation shows that there is some evil to be remedied, or some danger to be averted, or some benefit to be gained, and the necessary action is beyond what reasonably can be expected from voluntary exertions, then it is the duty of the State, since it is the one organisation that exists for promoting the common interests in any direction whatsoever, to take the burden upon its own shoulders. If it fails to do so, it proves itself an incompetent or negligent trustee of the common well-being.

In the old days Indian Princes did not, as a rule, show great activity in the collection of statistics, though the greatest of all, the Emperor Akbar, was an exception. Under stationary economic conditions this neglect was natural; and it has so long been the custom that the ordinary Indian agriculturist or business man is likely to misunderstand enquiries into what he regards as his private business. He is apt to regard them as probably a preliminary to some new form of taxation, and to frame his answers accordingly. But, however the case might be when life went unaltered from generation to generation, with the exception of occasional calamities like famine, pestilence, or invasion, the case is very different during our own time. Great inventions are rapidly transforming methods of manufacture and transport: India is linked up with all the world by lines of steamers and is traversed in all directions by lines of railways; produce is easily transported into the country and away from the country; hand spinning is practically extinct; handloom weaving is faced with the competition of the Bombay mills as well as those of Lancashire. Innumerable opportunities for industrial progress are presented; but on the other hand there is danger that those countries and peoples which fail to avail themselves of the new opportunities will sink into greater poverty than before. Hence there is a necessity for this State, and for other Indian States, to take stock of their resources; to ascertain what mineral resources lie latent and capable of profitable development beneath the soil; what water power can be utilised; what further agricultural progress can be achieved; for what industries the conditions of success are here present; and to what extent and under what conditions industrial progress is being achieved, whether purely by the efforts of the people themselves or through the active help and encouragement of the Government. In making such enquiries it is to be borne in mind that the economic condition of any State of India is not necessarily satisfactory when the existing resources and income are sufficient for the people. In India the birth-rate is very high; how high, nobody knows, but certainly a great deal higher than it is declared to be in the official statements on the subject. The death-rate also is very high, but not so high as to preclude a great annual increase of

population in every year which is not marked by some special calamity. The movement in the direction of learning the secrets of diseases for the purpose of combating them is one of the most vigorous of our time. All civilised nations, in times of peace, have been rapidly reducing their death-rates ; progressive India will naturally do the same. But the conditions which determine the birth-rate are deeply fixed in customs and religious beliefs founded upon natural instincts, and therefore we can hardly anticipate any reduction in the Indian birth-rate corresponding to the possible reduction in the death-rate, for a very considerable period of time. It is therefore necessary, not merely to enquire whether the present resources are sufficient for the present population, but whether a continual advance in the production of the necessities of life can be secured keeping pace with a continual increase in the population.

We want, therefore, what may be termed a statistical survey relating to industrial progress ; and this is the line on which the collection of economic statistics of the State of Mysore has been developed. Recent events remind us that there is another purpose for which it is equally necessary that the rulers of the State should have the fullest possible information about the economic condition of the people. There has been a considerable failure of the rains ordinarily coming with the south-west monsoon ; there is a great deal of anxiety as to what rain may be forthcoming during the period of the north-east monsoon. It is the aim and business of Government in such circumstances to avert economic disaster from the people. There are things it can do ; it can prohibit the export of grains ; it can take special steps to secure import ; it can fix prices ; it can commandeer stocks. In order to know what it ought to do, to know, for example, if it fixes prices, what prices should be fixed, it requires accurate information, as, for instance, with regard to the quantity of stocks in the country, the amounts that may be available outside, and the necessary consumption of the people. The more full and accurate the information which the State has been in the habit of collecting in normal times, the easier it is for it to gather the needed information, without uncertainty or blunder, in a time of special emergency.

I do not think that I need elaborate my contentions that an active economic policy is the duty of the State, that such a policy should be guided by accurate knowledge, and that the knowledge must be gathered largely in a statistical form. But I should like to utter two warnings. The first is that in statistics quality is of great deal more importance than quantity. You can gather together statistical information on a vast scale, and then hand the facts and figures collected to a body of experts who will collate them and draw the inferences from them which they are capable of yielding; and then you can have economic experts to advise in the policy which the results indicate as advisable. But the whole of this work is vitiated if the clerks or village officials, who in the first place gather the information, fail to put down what is actually the fact. It appears to me that in India it generally happens that the first collector of statistical information has very little appreciation of the object for which the statistics are required and very little conscientiousness in the matter of accuracy. Just as the Indian servant of an European master is reported to have said, "What master wanting, that only I saying," so the local subordinate official appears to me to take up the attitude "the Sirkar wants figures; I must give the Sirkar figures. What figures is the Sirkar wanting? I will put down the figures that will give the Sirkar the most satisfaction." I could give you an example from my personal experience. I was once staying at the house of a Principal of a College in India. He received forms from the Government asking for various items of information with regard to the college, one being the question "how many students were living in hostels inspected and controlled by the college." He handed over those forms to his chief clerk. The chief clerk, being a highly respectable and trusted official, filled up the forms and handed them over to the Principal. My friend looked them through and found, I think it was, 537 students stated to be living in hostels controlled by the college. He remonstrated and pointed out there were no such students and no such hostels, and asked the clerk how he came to make such a gross mistake. The clerk explained that he thought the Government would not be pleased if they found the number 0 against this particular query; he thought that the Government would

like to see a nice big number, and so he put down a nice big figure accordingly.

I am inclined to think that this weakness is very widely prevalent. Whether it is the case in Mysore, I have no special information. But with regard to a neighbouring State, the State of Hyderabad, I have noticed that the census figures regularly show more husbands than wives living at the time when the census is taken, by a good many thousands. Now, Hyderabad is a Muhammadan State; there are therefore a certain number of husbands who have more than one wife; but I have never heard that any section of the population of Hyderabad practises polyandry, the custom which would allow one wife to have more than one husband at the same time. Hence I am convinced that the State of Hyderabad has really more wives than husbands, and when the census report declares that it has more husbands than wives I am convinced that the census report is not to be trusted. If the census report is not to be trusted we do not even know how many people we have in india. Still less do we know at what rate people are being born and dying. Just this time last year I was engaged in an examination of the registration of births in the city of Kumbakonam, and I made some cursory examination of the way in which statistics of births and deaths are collected for India generally. I came to the conclusion that the actual births and deaths are grossly understated. But whether it is 20 per cent., or 25 per cent., or 30 per cent., or more of the actual births and deaths that fail to be registered I cannot tell you. Probably the deficit is in the neighbourhood of 25 per cent. When, however, we come to the statistics of the causes of deaths we are very far indeed from attaining even such a poor approach to accuracy as has been realised in the registration of births and deaths. Now if the most elementary vital statistics are so badly collected that any inference drawn from them is liable to be entirely misleading, you can well understand that there may be far greater inaccuracy in the more complicated economic statistics which the State of Mysore is collecting. I would therefore urge efforts in the direction of instilling a conscientious regard for accuracy into students in the colleges and boys in the high schools from which

recruits to the Government services may be obtained. I might of course expand on this point and may draw your attention to the general need of instilling a reverence for the broad ideal of conscientiousness in all work undertaken throughout the ranks of all who come within your system of education.

Another warning I would like to utter is that you should not, in your search for economic truth, whether by statistical enquiry or otherwise, put too narrow an interpretation upon the word 'economic'. Everything that relates to ordinary human life is to some extent within the scope of Economic Science, nor can any hard and fast rule be drawn between economic and non-economic aspects of life. Recently, Lord Ronaldshay drew attention to certain alarming assertions with regard to the prevalence of hook-worm in Bengal. This perhaps you will regard as more a medical than an economic question. But, as a matter of fact, prevalence of hook-worm is a very important economic fact, not only because the vigour and vitality of the population is one of the most important factors in wealth production, but also because the production of wealth itself is only a means to an end, that end being the maintenance and advance of human life, physically, mentally and morally to as high a plane as can be reached. There has been a time in India when economic enquiry was too much neglected; to-day the importance of the study of economics is generally recognised, and the presence of a certain number of University Professors of Economics in India is a sign of that recognition. It is now therefore, I think, becoming necessary for a Professor of Economics not only to draw people's attention to the importance of the subject which he professes, but also to warn them against what has been termed the "obsession of economics", and to remind them that life itself is something higher than the mere means of living.

Mango Hoppers

BY

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THE notorious uncertainty of the mango crop is due to species of small insects called hoppers and to a mildew both of which attack and destroy the blossoms. It is seldom that the crop succeeds in steering clear of either of these. When the blossoming season is moist and cold, the mildew is more responsible and when it is dry and warm the insects are more to blame. I shall deal with these latter in the present article. They are small wedge-shaped insects belonging to the class of bugs. They feed by sucking. They are very active and the pattering noise that one hears on going underneath an infested mango tree is due to these insects flying away and settling among the leaves on approach. The adults of one species, for there are three species concerned, spend the daytime on the trunk or branches of the tree, the other two species on the leaves. All the three are found practically throughout the year but in rapidly diminishing numbers after the season is over until the blossoming season returns when they multiply again. The numbers of the three species vary. In one year one species may be numerous and in another one or the other of the rest of the two. What this is due to has not been satisfactorily determined.

The bugs damage the blossoms by the punctures which they make both for feeding and for egg-laying, each female is capable of laying not less than 50 eggs, and the eggs develop into adults in about a fortnight at the most. This rapid multiplication results in thousands of young and adults which may be found crowded on the flower spikes and the rapid draining of the sap often proves fatal to the blossoms which shrivel and drop off. The badly infested trees will have leaves covered over with 'honey dew' a sweet secretion from the young hoppers which may be noticed as falling as fine drops of rain beneath them.

Spraying with fish oil resin soap at the rate of one pound in 10 gallons of water has been found to be very effective. The insecticide is cheap and obtained from the Madras Fisheries Department, at Tanur. Spraying has to be done at intervals of a week and about 7 to 10 sprayings are necessary during the blossoming season. For small trees a pressure sprayer is enough but on larger estates of several hundreds of trees a barrel sprayer is necessary. The treatment does not affect the blossoms or the fruit.

This treatment can be carried out only on fairly large topes and requires preliminary investment in a barrel sprayer and chemicals. Those who own a few trees in the garden attached to their houses cannot be easily pursuaded to go in for this remedy. And for them a different one is required. It is believed that the following method will answer their purpose. A large tin sheet is smeared over with tar and is attached to the end of a long pole. This sheet is brought rapidly against the trunk and branches and leaves of the tree in those parts where the insects congregate. The insects on trying to escape are brought sharply in contact with the sheet and get stuck there. In this way the numbers can be reduced considerably but to make the treatment effective it has to be carried out before the blossoms are formed. The survivors of the previous season would then be very few and these would not take long to catch. Once breeding has commenced the treatment will have to be repeated many times more.

This is the only treatment on a small scale. Experiments and observations are being continued in the hope that a simpler treatment suited both for topes and individual trees will be found. In the meanwhile it is hoped that readers of the journal who own only a few trees will give the one just described a trial and report their experience for the benefit of the members of the Union.

The Cultivation of Onions in Lakshmisagara, Mysore District

BY

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LAKSHMISAGARA is a village about six miles from French Rocks town, situated at the foot of a small range of hillocks. The source of water supply for irrigation of this village is from the Thonnur tank which is about 4 miles off this place and the supply is perennial. Onion and paddy on wet lands and Ragi on dry lands are the crops chiefly grown. Onion is grown on a large scale rotated with paddy and being a money crop, more care is bestowed upon it, and is a speciality of this village. It is cultivated mostly on wet lands under tank irrigation. As a market-garden crop a few ryots grow it on a small area under well irrigation. Under ordinary conditions, a yield of about 320 maunds of onions per acre is obtained, worth about Rs. 240 to Rs. 300 depending on the market rate. Mysore, Bangalore, Chennapatna, Tumkur and Chenrayapatna are the chief markets for this onion.

Soil and Season.

The soil is of black sandy loam and red sandy loam friable and well drained.

There are two seasons for planting. The first one is in the early part of January in the Purvashada rain; the second is in the Mungar rain of Rohini, *i.e.*, in the beginning of June. The season of planting affects the duration and yield of crop. The first crop takes full three months to mature, and gives slightly less yield than the Mungar crop which occupies the ground only for a period of two and a half months.

Variety.

There is only one variety cultivated, called Raja Irulli which is of reddish colour, and the diameter of an average bulb is $1\frac{1}{4}''$ in the widest part.

Seed bed and Sowing.

Seed bulbs are raised in beds ($4\frac{1}{2}' \times 1\frac{3}{4}'$ each) from seeds, and allowed to rest from 40 to 50 days, after they are removed

from the ground, and then planted. Simultaneously with transplanting of the seed bulbs big matured bulbs are planted in separate beds for seed, and seeds are sown in nursery for raising seed bulbs for the next season.

100 beds ($4\frac{1}{2}' \times 1\frac{3}{4}'$ each) or one *gunta* of land is sufficient to plant matured bulbs to get seed for sowing 100 seed beds ($4\frac{1}{2}' \times 1\frac{3}{4}'$ each) which give enough seed bulbs for transplanting one acre. The seed beds are dug with *gudaly* or ploughed three times, during October to December, for the first crop and during April and May for the second crop and exposed to weather. After the land is reduced to fine tilth it is manured with cattle manure at the rate of 10 cart loads per acre and ploughed once again. Then the beds are formed and sown with fresh seed, for seed bulbs and in separate beds matured bulbs are planted for seed. When sowing the seed, it is only put just under the ground, as it requires very slight covering of soil. The matured bulbs are planted about 4" apart each way, leaving the 'neck' about $\frac{1}{4}$" above the surface of the soil. There are few seeds so annoyingly deceptive as onion seed, as old seed will lose its germinating power, and seeds imported unless properly preserved will scarcely germinate at all. Therefore the ryots of this village pay special attention to raise their own seeds. About ten seers of seed is gathered after four months from 100 beds planted with matured bulbs. The seed is well dried and preserved in earthen-pots covered with straw ashes, and plastered with cowdung and red earth to make it air tight. Seed sown in the nursery germinates in about a week, and the seed bulbs are removed when they are about 40 to 50 days old. The tops are wrung out and bulbs are left in a heap covered over with Jola stalks or spread on the floor inside the house subject to a free current of air. Should they show signs of heating, they are at once turned over and the bad ones picked out.

Preparatory Cultivation and Transplanting.

The land is ploughed five times with the country plough, and brought to a fine tilth, during the months of October to December or April and May. Then beds ($4\frac{1}{2}' \times 1\frac{3}{4}'$) are formed with bunds 4" wide and 3" high. Three men prepare 1,000 beds in a day.

4,000 beds are made in an acre of land. No manure is given until the first hoeing. Planting is done in the afternoon after 2 o'clock, or in the morning on a cloudy day. Before planting the beds are watered, dug with *gudaly*, levelled and then planted with seed bulbs, 4″ to 5″ apart each way. Ten women and seven men in half a day plant 1,000 beds.

After Cultivation and Irrigation.

Only one hoeing is given twenty days after planting, when the full dose of manure (10 cart loads) is applied. One woman for every 150 beds is employed for hoeing and four men per acre for manuring. For the first forty-five days the beds are hand watered once in three days from pits (2′ diameter and $1\frac{1}{2}$′ depth) dug out in the field at convenient distances according to the area of the field. These pits are filled with tank-water from the irrigation channels. After forty-five days the crop is flooded once a week.

Harvesting.

The crop matures in $2\frac{1}{2}$ to 3 months. One man is employed to dig out 100 beds, wring out the tops and clean. The bulbs are stored in the same way as the seed bulbs if necessary. If stored for three months about 20 per cent of driage will occur. The yield per acre ranges from 300 to 400 maunds. There are cases where the yield has been over 500 maunds per acre.

The charges of cultivation for, and outturn from, an acre are given below:—

Cost of raising seed to sow one acre.

CHARGES.

	Rs.	a.	p.
Ploughing 1 gunta of land 4 times ...	0	2	0
Manure $\frac{1}{4}$ cart load at Re. 1-8-0 a cart ...	0	6	0
Forming 100 beds $4\frac{1}{2}' \times 1\frac{3}{4}'$ at the rate of three men for 1,000 beds at 4 annas each...	0	1	2
Cost of bulbs	1	0	0
Manuring and planting: 1 man for $\frac{1}{2}$ a day ...	0	2	0
Sixteen waterings: three men for 4,000 beds at 4 annas each ...	0	4	0
Total ...	1	15	2

Cost of raising seed bulbs to plant one acre.

	Rs.	a.	p.
Ploughing 1 gunta of land	0	2	0
Manure $\frac{1}{4}$ cart	0	6	0
Forming beds, 100 beds $4\frac{1}{2}' \times 1\frac{1}{4}'$ ...	0	1	2
Digging, levelling and sowing, 1 man for $\frac{1}{2}$ a day	0	2	0
Twelve hand waterings	0	3	0
Total ...	0	14	2

Cost of cultivation for one acre of crop.

	Rs.	a.	p.
Ploughing one acre 5 times (6 ploughs at 12 annas a plough)	4	8	0
Levelling and forming beds at the rate of three men for 1,000 beds at 4 annas each...	3	0	0
Cattle manure, ten cart loads, Re. $1\frac{1}{2}$ a cart ...	15	0	0
Watering beds, digging, levelling and planting at the rate of ten women and seven men for 1,000 beds working half a day; man 4 annas a day; woman 1 anna 4 pies a day	5	2	8
Hoeing and manuring at the rate of one woman for 150 beds at 1 anna 4 pies each and four men per acre at 4 annas each	3	8	0
Twelve hand waterings for $1\frac{1}{2}$ months at three men for 4,000 beds at 4 annas each ...	7	8	0
Guiding water for a month	1	0	0
Harvesting and cleaning 1 man for 100 beds at 4 annas a day	10	0	0
Assessment chargeable at Rs. 6 per acre for one acre and 2 guntas	3	2	6
Tolal ...	52	13	2
Total cost of cultivation ...	55	10	6

N.B.—Being a monsoon crop watering charges are so low.

Outturn.

		Rs.	a.	p.
Yield per acre at 8 mds. for 100 beds, 320 maunds Value at 12 annas a maund	...	240	0	0
Cost of Cultivation	...	55	10	6
Profit per acre	...	184	5	6

Agricultural Wages in the Channel Tracts of the Mysore and Seringapatam Taluks

BY

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THE agriculturists of this tract consist largely of Gangadikar Vokkaligars. They are a class who have grown into considerable affluence in recent years, owing principally to the fact that they farm the channel irrigated lands of these taluks and are able to get at least one assured crop of paddy in the year. The same reason has made them averse to actual manual labour in the fields from which they are gradually withdrawing, leaving it to paid coolie labour. The agricultural labouring class consists almost solely of Panchama, who hardly possess any land of their own and have consequently to depend upon coolie wages. So great however is the demand for labour that unless very satisfactory arrangements are made, it may not be possible to obtain sufficient labour at the proper time.

The arrangements between these landowners and their labourers obtaining at the present time are detailed below :—

This service is of three kinds—

1. Annual service of all kinds of work to be done both at home and in the field.

2. Seasonal service lasting only for a certain period, or for a certain kind of work only.

3. Temporary daily labour.

1. Annual service is agreed upon by means of written *karars*, with or without registration, between the master and the servant, as elsewhere in other districts, and in almost all cases there is the system of advancing money by the master without interest up to a maximum of Rs. 200, above which, if paid, the sum carries interest at 12% per annum. The peculiar feature of this here is that, if a Gowda who wants to take a servant by paying advance does not possess enough extent of wet land, which is not less than 5 or 6 acres per servant employed, he takes land on lease for which there is plenty of scope here always, in order to get sufficient compensation for the amount he spends on the servant as wages in money and kind, and for his maintenance for a year. The annual emoluments of the servant are—

(*a*) the amount of interest on the sum borrowed;

(*b*) the cost of his maintenance which is generally two full meals and one half meal in the form of a lunch; this in a normal year comes to Rs. 4 a month; clothing which consists of about two coats costing Rs. 1-8-0, two chaddies costing Re. 0-12-0, one vastra costing Re. 0-12-0, and one kambly costing Re. 1-4-0; total Rs. 4-8-0;

(*c*) cash at Rs. 10 or Rs. 15 per year according to the age and work of the servant; one candy of 180 seers of paddy; the standing crop of one of the plots in the Gowda's land the area of which does not generally exceed 144 square yards; the sweepings from the threshing floor after the principal heap is removed including the grain scattered during winnowing; the total quantity in grain comes to about $2\frac{1}{2}$ candis which is valued during the harvest season at about Rs. 20;

(*d*) any presents during the occasion of marriage either in the master's or servant's house, big jatras, etc., this is not very common. Total annual emoluments :—

	Rs.	a.	p.
Interest on Rs. 100 say ...	12	0	0
Food	48	0	0
Clothing	4	8	0
Cash	10	0	0
Grain	20	0	0
Total ...	94	8	0

2. *Seasonal service.*—In this case also an amount has to be advanced which does not exceed Rs. 25. The servant who borrows should either cart Mysore street manure for one month, receiving one meal a day in the lender's house on the days worked; or work in the puddled land for twelve days. The idea is that the servant is expected to do Rs. 3 worth of work which is the interest on Rs. 25 for the year in which the advance is made, failing which the principal with the interest should be returned within the year. If this is not done, one month's extra labour should be done by the servant without getting the one meal allowed in the first year.

3. *Temporary labour.*—Paddy is the only crop for the cultivation of which labour is employed here. During the cultivation season a male labourer of the same village in which he is employed gets annas five and a meal. A man from another village gets annas four plus two meals a day.

Transplanting is generally done by groups of women who are 25 in number and who work jointly during one whole season, and divide the earnings among themselves. The unit area on which the contract amount is calculated is an extent of land which takes 180 seers of seed paddy. This at the rate of 60 seers per acre comes to 3 acres. The wages for this in lump sum is Rs. 4-8-0+annas 8 present. These 25 women plant 3 acres in a day. The seedlings for this area are lifted by 12 women from the nursery for which they get at Re. 0-2-8 each

per day. Lifting and transplanting together works out at Rs. 2-5-4 per acre.

For gathering pods of green manure crops such as greengram, blackgram and cowpeas, the wages are always paid in kind at $\frac{1}{8}$ of the quantity gathered by each woman per day. Wages for harvesting paddy are one kolaga of 8 seers of paddy per man or woman or a boy or a girl. It is very difficult to get labour in time at this season.

The Agricultural Court,

All-India Agricultural and Industrial Exhibition, Mysore, Dasara 1918

BY

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THERE was more than one new feature about the Agricultural section in this year's Exhibition. Foremost, is the fact that we moved into a separate and commodious building practically all to ourselves barring a portion taken up by the sister section of Sericulture. The large iron-roofed structure—tired visitors may have found it endlessly long—to the right of the main Exhibition block was the building selected ; the district agricultural exhibits were all handed over to the department for being housed in the same building, so that a regular Agricultural Court was constituted with all the various agricultural exhibits under one roof. The ornamental porch in front of the building duly blazened this fact in the midst of a gorgeous display on canvas of typical agricultural scenes in the State. Our departmental artist who, for the nonce turned scene painter, made as usual a splendid piece of work of it.

The demonstration plots which in the previous two years were in the four acre field adjoining the main buildings were this year laid out alongside of the new court, so that though they were not so extensive they had the advantage of being situated near enough to be inspected by every visitor. This indeed visitors could not help doing, for we had so arranged the ingress to the

courts, the passages inside and the exit out, that visitors had to take the whole circuit, once they entered the court ; there were no short cuts, there were no cross passages ; they had to feast their eyes, and enrich their store of agricultural knowledge and continue to do so, till they came out, perhaps panting and staggering under this load of information.

We shall not submit our readers to this trial, for here we shall take them only through the chief centres of interest. The Silk House which was the first exhibit as you enter was really a silken house ; soft, dainty, rustling drapery of Mysore silk, in delicate tints ; and nestling in padded cases lighted by electric bulbs, the cocoons of many breeds of the silkworm, both pure and crossbred, the results of the experiments of that department. Then there was the rearing house, drab uninteresting looking shelves from a distance, but inspected close, full of teeming life that gave you the creeps as you passed from one shelf to another ; from the tiny day-old baby worm to the fat full grown ones as they spin their cocoons to sleep in, till they emerge to their bridal glory or—horrible fate—to be boiled alive in the reeler's cauldron.

The Salvation Army's silk exhibits from the Tata Silk Farm were in a neat and self-contained stall, where they exhibited not only their manufactures but their reeling machine and other appliances.

The Indore State had a sericultural exhibit, where yarn dyed with a variety of shades of color produced from indigenous vegetable dyes was a feature.

In the Argicultural Section proper the special features were, firstly the ragi exhibits from the Hebbal Farm, where by means of actual growing plants, sheaves of earheads, and grains, the various types being experimented with and studied in the breeding plots were illustrated, in a striking manner. There was then the vast array of the various grains, pulses, oilseeds, etc., perhaps uninteresting to the ordinary visitor, but which always attracts the learner. The Hebbal Sugarcane varieties, some splendid Red Mauritius canes grown in the districts from seed sets distributed by the department, single seedling clumps of paddy, good specimens of green manure crops like sannhemp and daincha from the districts, indigo, and a model of vats, presses, etc., of an indigo

factory presented by one of our indigo manufacturers in Kolar, were noteworthy.

The demonstration plots were fortunately all in excellent shape. A large variety of green manure crops, fodder grasses, cottons, tobacco, sugarcane, potato, turmeric, paddy and ragi occupied the bulk of the area. The single seedling plots of paddy were remarkably good, and so was the plot on to which our special mixture was applied. The Ragi manurials showed well that nitrogen was the only thing that mattered in these soils. The buckwheat, linseed, cowpeas, sannhemp and daincha were all in flower, which gave a decorative effect in that educative scheme. We had a few sandal plants showing Spike. from the Mycological Section, growing in this area and also growing specimens to illustrate the transmission of the disease to healthy trees by the grafting of the spiked branches. Sericulture was represented by mulberry plots showing different methods of planting.

The department made a speciality of Implements in this Exhibition. There was a complete collection of the indigenous agricultural implements and appliances, from ploughs, harrows, and hoes and seed drills, down to seed bins, not excluding even the steel thumb nail used for picking betel leaves. It was a collection on which much thought was spent, and as a museum collection for any agricultural college it would be hard to beat. Side by side with the local implements were the improved ones recommended by the department.

The Arecanut drying furnace now being popularised by the department, and the improved jaggery boiling furnace, were demonstrated during the exhibition on several days. So was the Dairy where cream separation and butter-making went on daily. The butter was sold this year in specially made tins with an attractive label and wrapper ; the demand for butter was too great to be met satisfactorily. Ploughing and other tillage implement demonstrations were held as usual.

The Cochin Department of Agriculture had sent a very good collection of cocoanuts and cocoanut products which attracted much attention, and we take this opportunity of thanking

THE AGRICULTURAL COURT, MYSORE EXHIBITION—VIEW OF FRONT ENTRANCE.

DEMONSTRATION PLOTS, MYSORE EXHIBITION—GENERAL VIEW.

Demonstration Plots, Mysore Exhibition—View of the paddy area.

Mr. I. Raman Menon, Superintendent, Department of Agriculture and Fisheries, Cochin, for his never-failing courtesy.

Among the exhibits from the Chemical Section were starches prepared from rice, ragi, potatoes, and tapioca, and samples of jaggery from juice limed to different degrees. The Mycological Section exhibited a large collection of living material showing diseases, in addition to the usual preserved specimens. Among Entomological Exhibits were the simple yet effective arrangements in seed bins to keep out the pest of stored grains. This forms the subject of a special bulletin now in the press, and so perhaps we shall not anticipate by describing it here. There were also the coloured posters, the first of a series, entitled "Death to Cumbli hulas" as devised by our "death dealer to insects" (Krimikeeta kalantaka),* the Senior Assistant Entomologist. We hope that visitors belonging to our agricultural classes felt themselves benefited by their visit to the Agricultural Court.

The Rat Pest in Cocoanut Plantations

BY

L. S. K. Pala Iyengar,

Passed Student, Mysore School of Agriculture, and Land-holder, Mysore District.

As everybody who owns a cocoanut plantation knows, rats are a serious pest in these plantations and the damage caused in consequence is considerable. They bore holes into the nuts to get at the milk and tender meat inside. The tender nuts are more largely attacked as it is easier for the rats to gnaw through them than through riper nuts. In my plantation the loss due to the pest has been as much as 30 per cent of the total produce. In one year I counted 2,000 nuts so ruined out of a total of 7,000 nuts. Colonies of rats establish themselves in the tree tops in between the base of the fronds and multiply in large number, so that the damage increases from year to year.

I have adopted in my garden the following method of dealing with the pest and I have succeeded in getting rid of it. The

* An appropriate *nom de plume* recommended for Mr. K. Kunhikannan (K. K. K.) by his appreciative colleagues.

remedy consists in nailing round the stem of the cocoanut tree at a height of some 7 or 8 feet from the ground a close fitting sheath of tin sheet. The smooth slippery surface of the tin affords no foothold to the rats, which consequently cannot climb up past this obstacle. I have found this very effective and it is also simple to adopt. An ordinary empty kerosine tin answers the purpose admirably; the top and bottom of the tin are cut off. the body of the tin is cut along the length, flattened out, fitted round the stem like a sheath, the ends overlapping, and then nailed down to the stem.

A very important precaution to take before the tins are fastened is to rid the plantation completely of rats. Every tree must be thoroughly searched, the nests removed, the rats chased down and killed. This is not easy as the rats hide in the base of the fronds and otherwise dodge for their very life. If this cleaning out is not done thoroughly, then the remedy is merely a waste of money as the rats which are left in the trees can jump from tree to tree and can practically live and multiply there as if nothing had happened. In cleaning out my plantation before putting on these sheaths, 65 rats were caught and killed; as the damage of 30% noted above was caused only by this small number, it can be imagined what the damage may be if the pest should increase. I have worked out the cost of "tinning" my plantation which contains 200 trees. The cost is as follows:—

	Rs. a. p.
200 tins at the rate of one for each tree at 2½ annas a tin	31 4 0
Cost of cleaning the tree tops and removing rats at 8 pies per tree ...	8 5 4
Cooly for cutting the tins and nailing them round the trees	2 8 0
Sundry expenses such as cost of nails, cooly to boys employed to catch and kill the rats as they come down, etc. ...	1 8 0
Total ...	43 9 4

EDITOR'S NOTE.—Our friend does not state the area of the garden; if 40 trees go to the acre as they do in many parts of

our State, the area is 5 acres, and the cost per acre at this rate of planting is Rs. 8-11-6. In a recent leaflet of the Bombay Department of Agriculture a method of " tinning " is recommended, but the tins are cut and put on in a different way. They are cut and fitted conically round the stem, so that the obstacle in this case consists of a wide thin ledge round the stem of the tree which no rat can negotiate. But our friend Mr. Pala Iyengar's " greasy pole " arrangement is certainly simpler, and is likely to be more permanent, for the " Disc " arrangement is always likely to become bent, or torn off by falling fronds or other causes.

The Right Method of Planting Sugar-cane Sets

BY

S. Daniell, L. Ag.,

Muktesar, Palace Estates and Gardens, Mysore.

THERE are various methods of planting sugar-cane sets practised throughout the cane-growing tracts in the State; they differ in different parts, but the sets are generally planted in rows; that is, the land is converted into ridges and furrows after deep cultivation either by digging or by the working of mould-board ploughs; the sets are planted first in furrows; then the canes are earthed up after a few weeks thus converting the furrows into ridges and ridges into furrows.

It has become a common practice that the cane sets are spread in the furrows before being covered up with earth, irrespective of the position the eye buds lie inside the soil, and it has also become a practice to thrust them by either end sometimes, so that they may go deeper into the soil which is moist enough after irrigation. In the first case, some of the eye-buds that face the bottom of the furrow may germinate but may not force their way up vigorously or may never germinate at all; in the second case, a few of the eye buds may be bruised by trampling or thrusting in by force and thus may be damaged. In both these cases, for every eye bud lost, there is, on the average, a loss of three to four canes out of every set planted, as from each eye bud we expect to get from three to four canes. It is therefore quite

essential that the cane sets should be planted in such a way as to get the largest possible number of these eye buds to grow. At present, very little care is taken in planting the cane sets and this is at least one reason why such a large number of sets as 15 to 20 thousand have to be planted per acre.

The proper method of planting cane sets should be to so plant them that the buds will face the sides of the furrow. By taking this early precaution it is found that all the buds give shoots rising directly upward and possessing an even stand. *Vide* Fig. IV.

Secondly, when sufficient space is allowed to every set planted, the shoots are found to tiller more freely. Therefore to get the required number of canes, it is not only essential to place the sets having the buds rightly at the sides, but to diminish the number of sets to as much as even fifty per cent per acre, though a margin may be allowed, in some cases, for failure of germination and the incapacity to produce great numbers of tillers.

In certain cane-growing tracts in the State, it has been constantly observed that the sets are planted from end to end in a continuous line and instead of doing this, if the cultivator leaves one set's space between every two sets, he can surely decrease the total number of sets planted per acre by one-third and by giving more space between the rows, he could still decrease the number by a fifth or a sixth. Now-a-days the area under sugar-cane is rapidly increasing with the result that the cost of sets has more than doubled. Reducing the seed rate and correct planting of the seed sets will however cut down this expenditure greatly, without diminishing the tonnage per acre. The cost of any additional labour required for this method of planting is trifling compared with the saving in seed.

Careful observations were made early in 1917 on the Government Experimental Farm, Hebbal, Bangalore, on the effect of germination and growth by proper and improper planting of sets in the non-experimental check rows both of Cheni and Pattapatti canes. The illustrations that were found typical were sketched out roughly when the cane crop was about a month and a half old and have been reproduced here.

Fig.1.

Fig.2.

Fig.3.

Fig.4.

Common methods of planting sugarcane ; Fig. 1, wrong method ; Figs. 2 and 3, sprouts from cane sets planted wrong ; Fig. 4, sprouts from cane planted in the correct way.

NOTES AND COMMENTS

By the Editor.

The Improvement of Cattle.

Our readers will be interested in the recent order of the Madras Government relating to grazing grounds, which appears under our "Selections." It is a very significant declaration of policy, which we hope will result in an automatic though gradual change in the methods of our ryots and bring in the time when we may expect to see fenced fields and fodder crops, a sure indication of thriving cattle. It will be seen that the rules are not inelastic and that any probable hardship to village communities is guarded against.

We also publish one of the recent orders of the Mysore Government sanctioning certain substantial concessions with regard to the keeping of breeding bulls. As usual the Government of His Highness the Maharaja have been quite liberal and we sincerely hope that our agriculturists will bestir themselves and take advantage of this as well as several other concessions which the Government have been pleased to accord in the last few years.

* * * *

The Consolidation of holdings in Japan.

Dr. Coleman who left on a year's furlough to Canada in July last makes the following interesting observation regarding the consolidation of holdings in Japan, where he had occasion to spend some time on his way home:—

Consolidation and redistribution of holdings seem to have progressed rapidly since I was here six years ago. On the journey by train from Kyoto to Yokohama I saw village after village with regular rectangular paddy fields, beautifully straight irrigation channels, and bunds reduced to a minimum. Even where bunds are present they are usually covered with crop, commonly soybeans. We have much to learn from Japan in the way of the proper utilisation of our more fertile soils, especially the irrigated ones.

* * * *

A Text Book on Plant Diseases.

We invite our readers' attention to the publication of an

important treatise on "Fungi and Disease in Plants" by Dr. E. J. Butler, Imperial Mycologist. The paucity of reliable treatises relating to the various branches of *Indian* Agriculture is a most striking drawback. Not many years ago, and it might be said that books of this category were like the celebrated 'snakes in Iceland.' They simply did not exist. This has been and still continues to be a serious handicap to both teacher and learner alike. We give the publication therefore a most cordial welcome. The name of the author puts the hallmark of excellence on the book; we content ourselves therefore by merely drawing attention to it.

* * *

The Mango Weevil.

We take the following from the latest Annual Report of the Department of Agriculture, Bengal:—

The item of chief interest in the report of the Entomological Section is the discovery of the egg of the mango weevil and the time of laying. This has for long baffled entomologists, probably because it has been all along supposed that the egg is laid when the tree is in flower. It has now been discovered that the weevil lays its egg when the fruit has attained half its natural size, the eggs being laid singly in small depressions on the surface of the fruit, and covered over by a coating of a black substance giving the appearance of black spots. This discovery combined with evidence that the egg-laying period is confined to a week or two at the utmost, ought to render remedial measures if not easy, at least practicable. As a very considerable amount of damage is done to mango fruit by the weevil, the subject is of great importance.

* * * *

Vegetable Carbons as Decolorising Agents in Sugar Manufacture.

The possibility of the use of vegetable carbons in preference to Boneblack for the decolorisation of syrups in sugar refineries has a peculiar interest to the people of India. In orthodox Indian households white sugar is strictly taboo on account of the use of bone charcoal in the making of the sugar. All white sugar comes under this ban, be it refined sugar in which Bone charcoal is used or direct consumption sugar in which Bone charcoal is not used

and which is now being made largely in Java and exported to India. The whiter the sugar the greater is the suspicion; and this popular sentiment affords a premium or "protection" to local made dull coloured sugars-a fact which unprincipled tradesmen have not been slow to exploit by the manufacture of faked up country sugar.

It has been recently claimed that various vegetable carbons, of which charred paddy husks constitute an important form can be used as a substitute for Bonechar. A patent vegetable carbon called "Norit" is being pushed on, but its efficiency is questioned. All these however are reported to be under trial, the result of which should have some considerable effect upon our sugar industry; for one thing it will remove the popular orthodox prejudice against white sugar. We wonder if any of our readers have ever come across the use of paddy husk charcoal by any of our local *swadesi* sugar makers, for the purpose of decolorising syrups.

Some Facts about the Sugar Industry of Java.

The following information relating to some aspects of the Sugar Industry of Java is extracted from the article "The 1917 Java Sugar Crop" by H. C. Prinsen Geerligs, Ph. D., in the International Sugar Journal for September 1918:—

Year.	No. of factories in operation	Area under cane in acres.	Yield of cane in tons per acre.	Total output of sugar in lbs. per acre	Percentage on total production of		
					White sugar	16/20 D. S. crystals.	11/13 D. S. crystals.
1917	185	396,440	43·09	10,117	50·3	40·6	6·2
1916	186	385,290	41·11	9,238	48·1	37·3	9·7
1915	186	373,500	37·99	7,788	43·8	34·9	14·1
1914	186	366,000	40·87	8,495	40·3	32·3	15·7
1913	190	359,200	41·63	9,110	32·9	30·0	20·9
1912	184	346,800	41·53	8,910	33·6	29·9	26·2
1911	185	335,600	41·94	9,617	35·2	33·4	27·1
1910	182	312,600	39·03	9,037	34·9	30·2	31·8
1909	182	301,700	40·63	9,075	28·1	26·1	42·1
1908	182	290,600	42·05	9,376	19·3	15·6	59·2

It is noteworthy how the manufacture of refining crystals 11/13 D.S. has gradually been given up, having fallen from 59·2 per cent of the total produce to 6·2 per cent; while the manufacture of white plantation sugar has gained ground, having risen from 19·3 per cent to 50·3 per cent of the total produce.

* * * *

Waterlifts, Bullock-driven and Engine-driven and their Comparative Cost.

We venture to think that one of the most important developments in Indian Agriculture in the immediate future lies in the application of mechanical power to the various agricultural operations now carried on either by manual or bullock labour. Whether they be waterlifting, sugarcane crushing, threshing, tractor ploughing and such operations directly carried on the farm or those like the ginning of cotton, the pressing of oil seeds, which are quasi agricultural, and which lend themselves to be worked in small outfits, the future is pregnant with possibilities. There have been failures no doubt, which have brought upon pioneers much loss and ridicule, but progress has been steady along many lines, showing only that here as elsewhere the path of progress lies often times only through failure. In our own State our readers are no doubt aware of the considerable progress that has been made along these lines, especially in the matter of irrigation pumps driven by oil engines. There is no more promising field for the Agricultural Engineer in this country than this matter of power-driven waterlifts. We do not refer merely to the displacement of bullock power in the ordinary methods of well irrigation. The banks and beds of our rivers, rivulets, and even river channels afford possibilities of irrigated cultivation which except with the use of such pumps cannot be thought of. The case of *kapile* wells (wells fitted with mhotes or bullock-driven waterlifts) is held to be different, and we have heard it doubted whether any appreciable saving is effected by the installation of engine driven pumps in such cases. In the current number of the Agricultural Journal of India Mr. W. M. Schutte, Agricultural Engineer to the Government of Bombay, deals with this aspect of the question, comparing the cost of irrigation by

both these methods. As the subject is extremely important we extract these figures below :—

TABLE I.

Irrigation by Mhotes.

Index letter.	Name of district.	Average lift in feet.	No. of acres irrigated	Nature of crops.	No. of mhotes.	No. of bullocks.	Annual expenses per acre.
							Rs. as. p.
A.	Dharwar ...	45	2	Sugar cane.	1	4	312—0—0
B.	Belgam ...	30	2	,,	1	2	127—8—0
C.	Jalgaon ...	37	2	,,	1	2	140—0—0
D.	Satara ...	36	2	,,	1	2	250—0—0
E.	Sholapur ...	40	2	,,	4	3	107—0—0

TABLE II.

Irrigation by Centrifugal Pumps.

Index letter.	Name of district.	Average lift in feet	No. of acres irrigated	Nature of crops.	B. H. P. of engine.	Size of pump.	Annual expenses per acre.
							Rs. as. p.
A.	Dharwar ...	45	15	Sugar	6½	2½″	84— 6—6
B.	Belgam ...	30	20	,,	6½	3″	59— 4—9
C.	Jalgaon ...	37	15	,,	6½	2½″	84— 9—7
D.	Satara ...	36	20	,,	10	3″	100—12—9*
E.	Sholapur ...	40	20	,,	8	3″	75—11—3

These figures are striking and we invite members owning power pumping outfits to give us the results of their experience.

The Food Situation in Mysore.

The present food situation in the State is as everybody knows causing grave anxiety. The Government have been trying to meet the situation ever since it began to assume serious proportions. By the appointment of a Director of Civil Supplies,

* In this plant, two pumps are taken into consideration owing to very great difference in the lowest and highest water levels.

by the limitation of Exports and by the fixing of maximum prices they have been cautiously and step by step adopting such remedial measures as will without undue hardship to any particular section of the people, yet relieve the general distress. Recently they have had to proceed further, have taken powers to commandeer all stocks of food grains, have appointed a Food Controller with a suitable working machinery for the purpose of taking a detailed census of existing stocks in the country and of the requirements of the population, for arranging to make good any deficiency by such imports from outside the State as may be possible, for making an equitable distribution of the supply, and for regulating traffic in food grains within the State.

No doubt there is a section of the public which deems the action too drastic and uncalled for, but when it is remembered that as it is, there will be a shortage of 300,000 tons of food grains before the next year's harvest is gathered, that the prospects of the Vaishak crops are not hopeful, that all reports point to a world wide shortage of food grains and that the previous milder measures have not had their expected result it will be found that in the absence of a better, this is the only course open to the Government. Possibly it may be that we are only anticipating or in some cases merely falling into line with the other States and Provinces in India in this matter.

Be that as it may, on our side we agriculturists have a grave and most important duty in the same scheme. We have to take special measures to produce as much food as we can. Just at present our only hope lies in such irrigated cultivation as we may be able to carry on with the limited supplies of irrigation water. Every effort should be made to improve these supplies. New wells may be dug, whether pucca or kutcha wells, the more the better; existing wells may be deepened, and the grant of Vaishak supply of water under Government sources of irrigation may be asked for as a special measure. There must be more co-operation and mutual understanding in the villages in fixing the area to be put under crop under the tanks which will probably have to be considerably restricted. Whatever we or the Government may do in regard to improving the supply of irrigation water, we must so use it that we procure the absolute

maximum of food with a minimum expenditure of irrigation water. Let us concentrate on the growing of semi-irrigated food crops, Ragi and Jola in preference to paddy, except of course where owing to the low situation nothing but paddy can be thought of; but even in such cases let us grow the early maturing varieties. Let us reduce to a minimum till we tide over this crisis commercial crops like sugarcane, garlic, onions, turmeric, potatoes, tobacco, and so on and raise a foodcrop instead, irrigated Ragi and Jola by preference. Where in tank-beds, and *saguvali kattays*, we used to grow bengal gram, coriander or wheat, let us grow jola instead, for what we want is food for man and beast, and food of such kind as is consumed by the largest number of our people. We have no doubt that all possible help will be readily forthcoming from the various departments of Government concerned. The Agricultural Department itself is preparing to meet the large demand for the different kinds of seeds mentioned above for this emergency campaign.

The Problem of Sugar Manufacture in India.

The interesting controversy raised by Mr. Wynne Sayer's article on the Problem of Sugar Manufacture in India, which has been going through two numbers of the Agricultural Journal of India, between him and Mr. A. E. Jordan, has just ended under the guillotine of the Editor. Without intending in the least to invite the controversy into our pages or presuming to pass judgment in the matter, we would make a few observations on this important subject. We almost feel it a duty to do so, for Mysore is one of the pioneers in the field of sugar manufacture. We had one of the largest refineries in South India located in Palhalli near Seringapatam; in recent years we had a similar refinery in Goribidanur. Of smaller refineries working on indigenous methods similar to those of the Khandaries of Upper India we had a large number in Mulbagal, Sidlaghatta and other parts of Kolar, and Bangalore. All these are now things of the past and where once machinery roared you hear jackals howl. We were furthermore on a fair way to having an up-to-date sugar

manufacturing business in the Marikanave tract, which came to nothing owing to the failure of the late Messrs. Arbuthnot & Co. Within the last ten years we have installed several small power crushing plants each consisting of an oil engine and a power mill. Experiments were under weigh in the manufacture of jaggery by the use of steam for heating instead of a direct fire; and perhaps it is no secret that large schemes for sugar manufacture are being contemplated.

Mr. Jordan himself is our old friend we almost said antogonist. He joined issue with our department most lustily some twelve years ago now, when Dr. Lehmann, our then Agricultural Chemist, advocated the manufacture of refining crystals in preference to that of jaggery or *gur*. This much then by way of justification for our reference to this subject.

Mr. Sayer is perhaps the sturdiest champion of the Sugar Industry in India that we have come across. A bolder demand for State aid to the industry we have not seen. for this is what he says: "we suggest that for the next ten years the import duty on sugar should be raised to 15 per cent for Mauritius and other British Colonies, 20 per cent for Java and other allied or neutral countries, and 25 per cent for Germany and Austria. The proceeds will be over a crore of rupees, and some portion of this money can be legitimately used for the fostering of the Indian White Sugar Industry." Such a frank demand for protection and a big dose of it, too, is a rare thing in this country and we are deeply thankful to Mr. Sayer for having given expression to it. How we wish that other Indian Industries had similar champions! One would have wondered after this, what there might be in the views of such a writer, to stir the ire of Mr. Jordan who is equally strong about the need for fostering this industry.

The chief point of contention however, and this is an exceedingly important point to us, may be explained thus:

Mr. Sayer would in effect classify sugarcane areas in India present and prospective into three classes, viz.

1. Very large areas which would justify the erection of a sugar factory.
2. Moderately large areas which may not be large enough for a sugar factory but in which large jaggery factories

can be established, where the cane will be handled much as in a sugar factory i.e., with krajewski crushers, multiple rollers, triple effects and vacuum boiling arrangements, but the final product will be only jaggery and not sugar; some of the necessary equipment for the latter will be left out and everything will be done as in a sugar factory short of separating the molasses from the crystals.

3. The still smaller isolated areas where the bullock mill and the open pan boiling over a direct fire, will remain and where minor improvements such as better mills, better furnaces, better methods of boiling, etc., will be the only ones possible.

It is the jaggery factories proposed for the areas under the second category that Mr. Jordan condemns. If the area is large enough to justify the installation of all the machinery mentioned, why stop short at jaggery, for it would pay to make sugar quite as well. This is his contention. The whole question as it strikes us is, what is really the minimum acreage that would justify a sugar factory. In his view even a factory turning out only 3 tons of sugar would pay, though naturally a larger concern would pay better. Now, this will mean with our Mysore cane and with the machinery proposed only about 150 acres of cane. If Mr. Jordan is correct, then it will not be a difficult matter to find suitable areas, and one great obstacle at least to the starting of sugar factories would disappear. Mr. Sayer on the other hand thinks that the area required for a successful sugar factory will run into thousands of acres. In fact even for a jaggery factory he would have a minimum of 250 acres; and in the 20,000 acres that will be soon brought under irrigation in the Bombay Presidency he thinks that only jaggery factories would be suitable. If such is the case, then the chances for the starting of sugar factories will be somewhat remote. On a matter of such vital importance we look for light in vain, for as we see there is the widest divergence of views between them, and both are equally emphatic in asserting them.

For our part like Sir Roger de Coverley, we would say there is something to be said for both sides. As against Mr. Sayer we

should say that we have never heard of any place in the world (we speak subject to correction) where jaggery is made on a factory scale in the manner contemplated by him. The only product at all similar made on such a scale is Muscovado Sugar. This is, however, a product from which the molasses have partially drained off, and it is, unlike jaggery, a commercial product which will not run and which will keep. Furthermore we have heard from large manufacturers of sugar machinery that they have supplied units of a capacity of even less than 5 tons of sugar a day.

As against Mr. Jordan, we have only to note that the 186 sugar factories of Java deal each with an area of nearly 2,000 acres; we invite reference to the table we give on page 41. What then is the chance for a pigmy 150 or 250 acre plant?

It is impossible for us to decide. We nevertheless rather incline to the more hopeful prospect to which a figure like say 500 acres would lead us. But is not a case made out for Government action in an important matter like this, which has been discussed now for years without any tangible progress to record. Is it impossible that an area of 500 acres with possibilities of extension could be taken up and an up-to-date factory erected and worked? There are a number of other points too on which data under Indian conditions are lacking. How else can these be decided? We venture to think that it is a matter demanding the urgent attention of the Imperial Department of Agriculture.

PERSONAL NOTES.

DR. LESLIE C. COLEMAN, the Director of Agriculture and the President of our Union, who has been granted furlough and privilege leave for one year left Bangalore *enroute* to Canada on the 23rd of July. Mr. H. V. Krishnayya, B.A., F.C.S., Chemist to the Departments to Geology and Agriculture, officiates.

The department has had an accession to its ranks in Mr. S. V. Venkatarayan, B.A. (Hon.), who has been appointed Junior Assistant Mycologist. We offer him our welcome.

We rejoice that the hostilities between the Allies and Germany have ceased and that peace is in sight. We hope as a result to welcome very soon our friend Dr. B. Narasimhaiengar, Ph. D., who may be our new Agricultural Chemist. Dr. Iyengar finished his course of studies and took the Ph. D. degree quite a year ago, but was held up in Germany on account of the War.

Mr. M. K. Venkata Rao, M.A., Senior Assistant Mycologist, has been granted a Damodar Das Scholarship for the study of Agriculture abroad.

Mr. N. Krishna Iyengar, B.A., of Oorgahalli has been appointed a Member of the Bangalore District Committee of the Economic Conference.

Mr. R. Gopalasami Iyer has been elected a Member of the Central Committee of the Economic Conference.

We congratulate our Secretary, Mr. G. S. Kurpad, B.A., on his promotion to the grade Rs. 150—20—350.

Mr. S. Daniell, L. Ag., Agricultural Inspector, has been transferred on promotion to the Palace Service, as Muktesar, Palace Estates and Gardens.

A Veterinary Hospital has been opened on the Hebbal Farm. This has been a long felt want. Mr. B. Lakshmipati has been appointed Veterinary Assistant in charge of the Hospital.

The hand of death has been heavy in our midst. Our worthy President, Dr. Leslie C. Coleman suffered a sad bereavement in the death of the late Mrs. Coleman which occurred in May last. The late Mrs. Coleman was personally well-known to most of our members; herself a graduate in Science, she took a keen interest in our work, and in our social amenities, she was a most popular figure. We offer to Dr. Coleman our deep felt condolence in his sorrow.

We bemoan the loss by death from heart failure of the late Mr. K. Narasimiengar, G.B.V.C., Veterinary Superintendent to Government and Instructor in Veterinary Science in our School of Agriculture. Mr. Iyengar was connected with the school ever since its commencement and was very popular with both the staff and the students. We have lost in him one of our enthusiastic well wishers and fellow workers.

Among the victims of the influenza scourge, were Mrs. K. Bhima Rao (wife of Mr. K. Bhima Rao, Assistant Chemist), Mrs. S. Krishna Rao (wife of Mr. S. Krishna Rao, Manager, Nagenhalli Farm) and the late Mr. Venkatagiri Rao, one of the very efficient clerks of the Director's Office.

We offer to the bereaved our deep sympathy.

SELECTIONS.

I.

The Enzymes of some Tropical Plants.

A paper on the above subject by Harvey C. Brill, Chief of the Division of Organic Chemistry, Bureau of Science, Manila, appears in *Tropical Life*, April 1918, from which the following is mainly taken.

An interesting part of biological chemistry is the study of enzymes, and their properties. Much is known regarding enzymes, but much is still to be discovered with regard to their functions in the growth of the plant, and their effect on digestive processes when taken into the human body along with food.

Some of the foods we are accustomed to eat uncooked contain enzymes of various kinds, and in different quantities. For example, Chittenden has investigated the pine-apple, and studied the proteolytic enzyme present in it. He calls this enzyme bromelin, from the botanic name of the family of plants to which the pine-apple belongs. Bromelin digests egg albumen and blood fibrin. A rennet-like ferment is associated with bromelin. Instead of purchasing pepsin at druggists' shops, which in many cases is worthless, because of faulty preparation, Mr. Brill suggests that it would be more profitable and agreeable to dyspeptics to purchase and consume pine-apples.

Another proteolytic enzyme is papain, which is obtained from the fruit of the papaw. Mr. Brill says that the ripe papaw fruit has all the virtues of the drug sold as papain, and besides is a delicious fruit. It is certain that this opinion is widely held in the West Indies, and it is claimed in these islands that many dyspeptics have been cured, or at any rate very much benefited, by regularly partaking of ripe papaws along with their meals. Papain is considered to be identical with, or at least to resemble, bromelin very closely.

The banana has recently been thoroughly investigated for enzymes. This fruit is rich in ferments, giving evidence of the presence of enzymes which influence the digestion of starch, sugar, proteins, and fats. Thus bananas eaten along with breakfast aids the digestion of all the materials which generally compose that meal.

The mango also contains a proteolytic enzyme which has properties similar to those of bromelin.

It would thus appear that these four prominent fruits of the tropics, the pine-apple, papaw, banana, and mango have a positive food

value other than that of nutrition, in that they aid in the digestion of other foods.

The simple synthetic food tablet which was to carry the necessary food elements—protein, fat, and carbohydrates—in the relative proportions demanded by the human body for its growth, development and performance of its daily duty, must now be relegated to the dreams of pseudo-science. The process of assimilating food is a much more complex one than was once believed, and the perfect food of the future will hardly be prepared in tablet form.

II.

Grazing Grounds.

The following Order of the Government of Madras, No. 3034, Revenue, dated 24th August 1918, has been issued:—

The Government have been considering the policy to be adopted, especially at the periodical resettlements, in regard to the treatment of porambokes set apart for the grazing of village cattle. Hitherto settlement officers have added to, or taken away from, the area of existing grazing grounds according to the estimated requirements of each village without any general instructions as to the objects to be kept in view being laid down for their guidance.

2. The Government consider that the policy of reserving waste lands on a large scale as 'grazing ground porambokes' is unsuitable to modern conditions and contrary to the best interests of cattle-breeding. As early as 1871, the Indian Cattle Plague Commission described these common grazing grounds as 'an abode and nursery of contagious diseases among stock.' The Agricultural Committee of 1888 expressed a similar view in the following terms:—

"It is agreed on all hands that so long as the common-herding system prevails, so long will cattle be a mixed and degenerated lot, the produce of immature bulls of the lowest type and common village cows of an equally low class; a "promiscuous union of nobody's son with anybody's daughter." So long as the common waste lands and village cattle-stands are frequented by half-starved cattle and sheep, a disgrace to their respective breeds, a fruitful cause of disease, no individual farmer could improve his breed of livestock."

Mr. Sampson, Deputy Director of Agriculture, observed in his report on the cattle survey of the Madras Presidency that "as far as the maintenance of the quality of the stock is concerned nothing can

be said in favour of communal grazing ; in fact everything is against it." In connexion with the question of the curtailment of grazing grounds which was considered in 1906, the majority of the Collectors consulted expressed themselves against the provision of grazing grounds. More recently the case against 'communal grazing' was succinctly stated by Mr. Chadwick in a leaflet published in 1913.

3. Thus according to expert opinion there is little prospect of any improvement in the quality of cattle while village grazing grounds continue in their present condition. To effect a real improvement in the quality of livestock, the ryots must be induced to substitute stall-feeding for the haphazard system of communal grazing. The land which is at present used as grazing ground could be used to much greater advantage in producing fodder as an agricultural crop. Experiments have shown that the fodder derived from a dry cholam crop is fifty times as much as the hay which can be got from the same land, and for an irrigated crop the figures are even more striking.

4. The Board of Revenue considers that no hard-and-fast rules of policy applicable to the whole Presidency can be laid down, since the varying conditions of the several districts and tracts of country require different methods of treatment, but that the gradual absorption of much of the available grazing ground by cultivation should be contemplated. In order to attain the object in view, the Board recommends the adoption of the following general rules :—

(1) That cattle-stands in the delta and black cotton tracts where grazing grounds do not exist to any appreciable extent and where cattle are generally stall-fed should be carefully preserved.

(2) That darkhasts for grazing ground porambokes in red soil tracts should be dealt with on their merits, after a consideration of the general conditions of the village, and should not be rejected summarily merely because the land is registered as grazing ground porambokes.

(3) That transfers of assessed and unassessed lands to grazing ground porambokes should be made only in exceptional cases and that special settlement officers should not make such transfers without the Collector's assent.

The Government accept the Board's proposals generally. At the same time they agree with the Board that the undesirability of any sudden and general abolition of grazing grounds should be impressed on district officers. The introduction of the policy outlined above though steadily pursued should be carried out with great care and discretion so as to avoid any unnecessary disturbance of rural economy

and to allow the ryots time to adapt themselves to changing conditions.

5. In G.O. No. 2435, Revenue, dated 26th June 1918, the Government in sanctioning certain changes in the Darkhast rules have agreed that specific areas may be reserved for eventual assignment to members of the depressed classes. The Board should invite the attention of Collectors to this possible method of disposal of unnecessary grazing grounds.

6. The Board of Revenue is requested to submit necessary amendments to the Resettlement Manual.

III.

Proceedings of the Government of His Highness the Maharaja of Mysore.

No. 11730-41—*A. & E.*12-17-11, *dated* 1*st June* 1918.

Rules for the Encouragement of Stock Breeding.

A grant of Rs. 125 to Rs. 150 a year will be made to an individual or a society for purchasing and maintaining at his or at its cost a good breeding bull, he-buffalo or a stallion, subject to the following conditions :—

1. The grant will be made by the Deputy Commissioner and President of the District Committee at the end of the official year on a report of inspection received from Superintendent, Civil Veterinary Department. It will be renewable every year for the same animal for a maximum period of four years. The grant will be withdrawn whenever the animal becomes disabled or a change of animal is considered essential.

2. The stallion, bull or he-buffalo should be housed properly and maintained in good condition.

3. A register of service by the animal showing the date, month and year should be maintained, the number of coverings in the year not falling below 40.

4. The owner of an animal is authorised to levy for each service a fee to be fixed by the Deputy Commissioner, in the first instance when application is made for the grant of a subvention under the rules and subsequently when the subvention is awarded year after year, after due consideration of the quality of the breeding animal and the conditions of the locality.

The registers will be in the following printed form which will be supplied free from the Agricultural Committee to the districts for distribution.

In each District, a register of the awards of subvention made under the rules shall be maintained in the following forms and after each award, a certified copy of the entry relating thereto shall be delivered to the owner of the breeding animal.

1. Name of village, taluk and district.
2. Name of owner of the stallion, bull or buffalo.
3. Age, breed, pedigree and marks of identification of the animal.
4. The cost for which and the locality from which it was purchased.
5. The date from which it has been maintained.
6. The date and authority of award.
7. Date and authority of renewal.

1. Date, month and year.
2. Description of the animal covered including its age and the number of the foals or calves she has had previously.
3. Fees collected.
4. Name of its owner and village.
5. The result of the covering.

All the breeding animals to which subventions have been granted in a district shall be inspected not less than once a year by an officer of the Civil Veterinary Department who shall within a week after inspection submit a report to the Deputy Commissioner in the subjoined form.

Report of Inspection.

1. Name of village, taluk and district.
2. Name of owner of the breeding animal.
3. Age, breed, pedigree and marks of identification.
4. The cost for which and the locality from which it was purchased.
5. The date from which it has been maintained.
6. Date and authority of award.
7. Date and authority of renewal.
8. Condition of animal, stall and premises.
9. Number of covering since last inspection.
10. Has the service register been properly maintained.
11. Number of calves or foals due to this breeding animal inspected, with remarks, if any.

IV.

The disinclination of past agricultural students to take up independent agricultural enterprise: its causes and remedies.*

Introduction. Meaning of the term.

Whatever may be the dictionary meaning of the word 'Enterprise' to the man in the street, it is associated with (1) a novelty of the scheme carrying with it a certain amount of uncertainty and risk, and (2) the possibility of very large profits consequent on the absence of all rivalry or competition. Very frequently also, it is further associated with, what, for want of a better word, we may call a '*Largeness*' of the undertaking. The Tata's Hydro-Electric installation with its declared dividend of over 130% on deferred shares is an example of a successful enterprise, while the large number of closed up refineries, cotton mills, motor-bus companies and liquidated banks afford examples of the unsuccessful sort.

Requisites for a sound enterprise.

Talking in a general way the chief qualities required of the person starting a sound enterprise would appear to be (1) a certain amount of capital or an easy command of credit, (2) a certain amount of nerve coupled, with a perennial attitude of Hope to carry the enterprise through, in the face of all difficulties, (3) power of organisation and thorough business habits, and (4) a sound and detailed knowledge of the scheme with all its possibilities and limitations. On the other hand the venture should be of such a nature as to afford facilities for the striking out of various new lines and should bear distinct promise of fairly large profits—such profits as would amply repay for all the profitless waiting in the early days of the scheme.

The issues involved.

The disinclination now displayed by past Agricultural students to take to independent agricultural enterprise may be due either to some deficiency in the type of men that are passed through our colleges, or to some inherent difficulties in Agricultural enterprises as such. It will conduce a great deal to clearness of ideas and facilitate an easy running down of the causes, that underlie such a disinclination, if we make a careful study of such of the private enterprises as are now

*Munagala Prize Essay: By T. S. Venkataraman, Esq., of the Coimbatore Sugarcane Breeding Station, taken from the journal of the Madras Agricultural Students' Union.

flourishing in our land, and examine the problem before us in the light of such a study.

There is a general lack of enterprise in our country and Agriculture shares the general fate.

At the very outset of our enquiry we are confronted with the fact that very little private enterprise is noticeable in any line or walk of life. It is true we occasionally hear of a cotton mill or gin started by a group of Nattukottai Chetties (a class of men who perhaps show the greatest amount of business capacity in South India), or a rice huller started by a rich mirasdar or a group of mirasdars in the Godaveri or Kaveri deltas. But such enterprises are really "very few and far between." The Madras University Calendar for the year 1916 shows that over 12,500 graduates had been turned out upto and inclusive of 1916 and they should certainly have included a fair number of Physics, Chemistry and Geology graduates. What is the amount of private enterprise that has been shown by these men? The same calendar further tells us that over 140 Engineers were turned out during the period and we have yet to see the starting of any independent private enterprise by them. It is obviously beyond the limits of this paper to go into the causes which are responsible for this general disinclination to take to private enterprise. The above enquiry has not altogether been profitless however because it has shown that a disinclination to private enterprise is not confined to Agricultural students alone but is widely prevalent.

Does Agriculture offer any special facilities for enterprise?

Such being the case we shall be justified in expecting independent private enterprise from agricultural students only if it can be proved that agriculture offers greater facilities for independent enterprise than any other walk of life. We shall now proceed to examine this statement.

Difficult to strike a new line in Agriculture.

As already mentioned Enterprise is often associated with a novelty of the scheme, a novelty which by elimination of all rivalry holds promise of large profits. In an old agricultural country like ours where the ryot has already learnt a good deal about his own business in that best school of all—the school of hard experience—it is very difficult—(I shall not say impossible)—to start a new line. Many a practice and many a crop now grown in a particular locality is thereafter a long series of eliminations and it is very difficult to change it for anything better. This is amply borne out by the difficulty

experienced by agricultural departments throughout India in finding out real improvements.

The absence of large unexplored regions.

This being thus ruled out of court, the only other direction in which we could expect facilities for independent agricultural enterprises, lies in the existence of large unexplored regions. We are told that such regions do exist in the New World and there we do hear of gigantic agricultural enterprises. That the above is an important condition for the development of agricultural enterprise, is further evidenced by the fact, that, in all those places where the country has been recently opened up by the creation of new sources of irrigation, such as the Periyar and the Kannambady scheme we already see the beginnings of such enterprise. We have a very good example of such a venture within a few miles of the College at a place called Semmedu. An enterprising ryot Mr. Vellingiri Gounder of Vellaikanar has founded a new agricultural colony in this place. We hear of large unexplored tracts in the Central Provinces and Berar where the work of the irrigation department is said to be, largely of a missionary character teaching the ryots the value and use of water. It is chiefly in places like the above that we should expect the beginnings of large agricultural enterprise in the future.

Scattered Holdings.

The subject of scattered holdings has been prominently before the public for some time and found a place on the agenda at the last meeting of the Board of Agriculture at Poona. To overcome this evil, even a recourse to legislation has been suggested from some quarters: and it is not therefore thought necessary, here to go into full details. Suffice it to say that it is a serious obstacle to the development of any agricultural enterprise while the different agricultural departments have found it a serious obstacle to the introduction of any improvement.

The inadequacy and uncertainty of profits likely to be realised are deterrants of very great importance and have in the past turned many an agricultural student from taking to private enterprise. Let us now consider this question under the two heads.

(a) Inadequacy of profits.

(*a*) The agricultural student likeliest to take to private farming is the one who possesses a fair amount of land to serve as a ground-work on which to build his venture. Imagine such a student discussing the question to himself at the end of his course. Naturally

he will take the private farming only, if he finds that the enhanced income he is likely to get in that way is greater or at least equal to the income he is able to earn on his own account, by taking to some profession or occupation other than agriculture. As for the land itself there are people about him only too eager to take it up on lease I have talked to some of the best men from the college and have been told that private farming is not sufficiently remunerative. My own experience tends to confirm the above. It is true, that absentee-landlordism steadily deteriorates the land and brings many other evils in its train; but so long as there exists this immediate prospect of a greater income by taking up some other profession, this lack of enterprise is bound to continue.

But let me not be misunderstood. I am not behind many others in my strong belief in the ultimate profits of scientific agriculture but I do know that my goddess is not over-lavish with her bounties. She rather prefers to have the fruits taken from her by steady and laborious toil.

(b) Uncertainty of profits.

A far more serious deterrant is the uncertainty of profits. Unlike the banker the tradesman or the shopkeeper the profits of an agriculturist is dependent on factors over which man has little or no control. The land may be well prepared, the seed sound and well selected and the quantity of manure very satisfactory; yet the failure of rain at the proper season or an excess of it may completely ruin the whole crop. The man gets into debt, the lender gradually tightens his grasp, the story goes round, the man is pitied and but serves as a warning post to his co-villagers. The number of deaths in a particular place or profession is calculable within certain limits and hence you have Life Insurance Companies. We have also Fire Insurance Companies and even Motor accident Insurance Companies. But an agricultural insurance company to provide against bad years is still in the womb of the future and yet unborn. Is it too much to hope that the future students of this College will bring it into being?

Risk from Cattle epidemics.

The risk involved by epidemics among cattle may not appear to be of much consequence to us townfolk but to the villager it is a deterrant of great importance and very often it is mentioned as contributing largely to the uncertainty of profits derivable from private agricultural enterprise.

We shall now proceed to consider causes of a minor importance.

Distaste of country life.

We are steadily developing an apathy, if not a contempt, for the country life and all that it connotes. The town with its mad rush, its fashions and its pleasures is luring away many a young man from the country and private farming. I have personal knowledge of a number of young mirasdars, who though possessing houses and large estates in a village, go to the nearest town and live there paying an occasional visit to the village to satisfy a rebellious conscience. And during these short visits he is only too eager to make much of his town-bred refinements and all that they imply.

The 'Lack of dignity' argument.

We frequently come across a veiled 'Lack of dignity' argument in connection with the labour involved in agricultural pursuits. To the ordinary villager the belt and badge of a peon has greater attractions than the pleasures of mhote driving under a cool Portia shade. The calm but rather monotonous life of the ryot has no attractions for the present generation.

The existence of an efficient Agricultural Class.

In the availability of cheap and efficient labour, and the existence of a class of agriculturists, who lead a hand to mouth existence by working perpetually for their masters, we have a contributory cause of some importance. If such a class were non-existent every mirasdar will perforce take to private agricultural enterprise of some sort. But this is open to the criticism that this is arguing in a circle.

The "Educated class" is not much represented in existing private enterprises and in the past the recruits to the Agricultural College were from this class.

Let us now turn our attention to the class of men who at present conduct and control private enterprises of sorts, and compare them with those who passed out of the Agricultural Colleges in the past. We at once notice that the 'Educated classes' are but little represented in such enterprises. The reasons for such a state of affairs are, fortunately, beyond the limits of the present paper and are of a rather contentious sort. To the educated poor want of sufficient capital has been a deterrant while to the educated rich the allurements of Government Service and of the legal profession have been too powerful. The students of the Agricultural Colleges, in the past at least, have been largely recruited from such a class. Nay, in the days of Saidapet, clerks from the Collectorate were often taken into the College with stipends and it is no wonder that the course came to be

thought of as a means for betterment of prospects. It is perhaps too soon to say, but even the Coimbatore men do not yet appear to have been much attracted by private farming.

Business men are required. Agriculture is as much a business as any other.

In other words the Agricultural College does not as yet appear to have attracted the right sort of men for private enterprise, men who combine capital with a born aptitude for business. In fact, one of the most promising line for improving the condition of the village ryot is to teach him business habits. The ryot is intelligent, industrious, shrewd, and responsive but as a business man he is not a very bright specimen. Perhaps his profession has made him so. There is so much room in his profession for the play of chance and fortune that he has ceased to have faith in the advantages of system and business methods. This reacts on the whole village and they are all on a par—the village carpenter, the village blacksmith and the cobler. But with the newly imposed quickening of life and all the competition that it involves he must soon change or shall have to go under.

Difficulty of suggesting remedies.

It is easy to see faults in a finished structure but infinitely more difficult to construct one, it is easy to bring forward a grievance but more difficult to redress one. Similarly we have found it comparatively easy to indicate certain causes as responsible for disinclination among past agricultural students to take to private enterprise but when it comes to a suggestion of remedies difficulties are met with in all directions. It is found, however, that the causes themselves indicate certain remedies and these will now be considered.

Greater amount of Research in Agriculture and in the allied Sciences.

In the first place many of the disabilities peculiar to Agricultural enterprises as such (such as difficulty of striking a new line uncertaintly of profits and the like) are to *some* extent remediable by a more organised research in Agriculture and in the sciences on which Agriculture should for all times depend. Such research should be thorough, straight to the point and carried more or less in a true missionary spirit. Our land has not been wanting in religious missionaries in the past and it is to be hoped that it will not be wanting in agricultural missionaries in the future.

The spread of the Co-operative movement as a stimulus to private Agricultural enterprise.

In the second place we can confidently look up to the Co-operative movement to initiate and foster a greater amount of private

enterprise among our agricultural graduates. A co-operative concern will not only command easy credit but besides distribute the risk and the consequent losses among a larger number of shareholders. Such a movement is specially necessary in a country like ours where the ryots are extremely poor and frequently fall into the hands of the money-lenders.

Some special inducements.

Thirdly Government could hold out special inducements to private enterprise by offering 'darkhast' land on easy terms to some of the best men from the College and by running some of the Farms on a purely *Profit and Loss* basis. Though it is quite untrue, the ordinary ryot is often inclined to believe that the expenses on Government Farms are much more lavish than a ryot can afford to. The suggested Farms should rapidly dispel such an idea.

CONSTITUTION AND RULES

OF THE

Mysore Agricultural and Experimental Union.

Name.

The name of the Association shall be "The Mysore Agricultural and Experimental Union."

Objects.

The objects of the association shall be:—

(1) To create and foster a feeling of unity of interest, among the members.

(2) To exchange ideas, to improve the stock of scientific knowledge and to further the development of agriculture in the Mysore State.

Motto.

The motto shall be in Sanskrit and shall mean "Agricultural Development—the hope of the nation."

Headquarters.

The headquarters of the association shall be Bangalore.

Constitution.

The Association membership shall be open to such people as have received training in some recognised Agricultural Institution and to the members of the staff of the Agricultural Department and to such others as have been approved by the Committee for membership.

The management of the Association shall be vested in a Committee consisting of:—A President, a Vice-President, a Secretary and twelve Committee Members, all to be elected annually.

Subscriptions.

The entrance fee shall be Rs. 3.

The annual subscription shall be Rs. 2.

Students of the Hebbal Agricultural School.

Students of the Hebbal Agricultural School will be admitted as associates without payment of fees and as such will have no voice in the management of the Union and will have no votes.

Bye-laws.

The President.

The President shall preside at the meetings of the Committee, and of the general body.

In case of an equal division on any question, the President shall have the casting vote.

The President is authorized to convene special meetings of the Committee and of the general body on his own initiative or that of the Committee or on a written requisition from not less than one-fourth the number of the members of the Union, specifying the subject for the discussion of which the meeting is to assemble. Such special meetings shall be convened within a fortnight of the date of receipt of the application by the President. In cases of urgency, the President shall have power to take any action which he may deem necessary without consulting the Committee which should be informed of such action at the earliest opportunity.

Vice-President.

In cases where the President is unable to attend to his duties, the Vice-President shall attend to them.

Secretary.

The Secretary shall manage all the correspondence of the Union, and shall have charge of all its records.

The Secretary shall be responsible for the proper maintenance and preservation of the records.

The Secretary shall enter the minutes of all meetings of the Union in a book kept specially for the purpose. Separate books shall be maintained for the Committee Meetings and General Meetings.

The Secretary shall convene all meetings of the Union. In case of Committee Meetings, at least three days' notice, and in the case of General Meetings at least a fortnight's notice shall be given to the members.

The Secretary shall be in charge of the finances of the Union. He shall collect subscriptions from the members, grant receipts, and keep an accurate account of all the receipts and expenditure.

The Committee.

The Committee shall meet as often as necessary for the efficient working of the Union. There shall be not less than four Committee meetings per year. Seven shall constitute a quorum. If business cannot be transacted at a Committee meeting for lack of a quorum, the

meeting shall be adjourned to a subsequent date of which due notice shall be given to all members. The adjourned meeting will transact business irrespective of whether there is a quorum or not. The Committee shall be responsible for the proper working of the Union.

Standing Sub-Committee of Management.

A Standing Sub-Committee consisting of the President, the Secretary and three members elected by the General Committee from among themselves shall be formed to manage the affairs of the Union. Three shall constitute a quorum and the same rule as regards transaction of business shall apply as for the General Committee.

The Standing Sub-Committee shall be responsible for all expenditure of money within the budget allotment, but may delegate such powers to the Secretary as it may consider necessary for the proper working of the Union.

Annual Meeting.

There shall be an annual general meeting of the Union presided over by the President, generally at the time of the Departmental Agricultural Conference. At this meeting the out-going Secretary shall read his report for adoption by the General Body. At this meeting annual elections shall be held, the out-going office-bearers being eligible for re-election. Papers will also be read giving the results of work done during the previous year.

Members wishing to bring up subjects for discussion at the meetings of the Union, must send in their subjects to the Secretary in writing, at least a week previous to the meeting.

At least one-third the number of members on the rolls should be present to form a quorum.

The Union shall not be dissolved unless three-fourths of the total membership vote its dissolution at two consecutive meetings.

Membership.

Applications for admission to the Union must be accompanied by the entrance fee. Forms of application can be had of the Hon. Secretary.

Office Bearers for the year 1918-19.

President :

Dr. Leslie C. Coleman, M.A., Ph.D., Director of Agriculture in Mysore, Bangalore.

Vice-President :

Mr. A. K. Yegnanarayana Iyer, M.A., F.C.S., Deputy Director of Agriculture in Mysore, Bangalore.

Secretary :

Mr. Gundappa S. Kurpad, B.A., Vice-Principal, Mysore Agricultural School, Hebbal, Bangalore.

Committee :

(1) Mr. K. Kunikhanan, M.A., F.E.S., Senior Assistant Entomologist.

(2) Mr. M. K. Venkata Rao, M.A. F.L.S., F.R.H.S., Senior Assistant Mycologist.

(3) Mr. K. Bheema Rao, B.A., Assistant Chemist.

(4) Mr. M. J. Narasimhan, B.A., Assistant Mycologist.

(5) Mr. V. K. Badami, L. Ag., Senior Assistant Botanist.

(6) Mr. D. G. Ramachandra Rao, Assistant Director of Agriculture in Mysore, Shimoga.

(7) Mr. N. Krishna Iyengar, Landholder, Urgahalli, Bidadi, Bangalore Taluk.

(8) Mr. R. Gopalaswami Iyer, Chamarajapet, Bangalore.

(9) Mr. Siva Rao Badami, L. Ag., Jahagirdar, Debur, Nanjangud.

(10) Mr. H. Sreenivasa Rao, Retd. Dt. Forest Officer, Hongenahalli, Malur Taluk.

(11) Mr. S. Linge Gowda, Landholder, Bull Temple Road, Basavangudi, Bangalore.

(12) Mr. L. S. K. Pala Iyengar, Landholder, c/o Mr. L. Sreenivasa Iyengar, Advocate, Bangalore.

Journal Committee.

The President.

The Vice-President.

Mr. K. Kunikhanan, M.A., F.C.S., Senior Assistant Entomologist.

Mr. N. Krishna Iyengar, Landholder, Urgahalli, Bidadi.

Mr. V. K. Badami, L. Ag., Senior Assistant Botanist.

List of the items of work proposed to be taken up by members in the current year.

Mr. Krishna Iyengar :—Correct figures for ragi and sugarcane, experiments with new strains of ragi.

Mr. B. L. Rangaswami Iyengar :—Correct figures for yield of coffee, cost of cultivation of coffee.

Mr. Srinivasa Rao :—Cost of cultivation and yield of ragi, potatoes and sugarcane.

Mr. Krishnappa :—Cost of cultivation and yield of sugarcane and potatoes, crop cutting experiments on ragi.

Mr. Siva Rao Badami :—Trial of Hebbal varieties of ragi, trial of varieties of sugarcane, cost of cultivation and yield of ragi and sugarcane.

Mr. Linge Gowda :—Cost of cultivation and yield of ragi and groundnut.

Mr. Balaji Rau :—Cost of cultivation and yield of jola, cotton and groundnut.

Mr. C. B. Krishna Murti :—Cost of cultivation, yield of jola and cotton.

Mr. L. S. K. Pala Iyengar :—Results of experiments on paddy transplanting, manurial tests with cocoanuts and preventing damage by rats.

Mr. R. Gopalaswami Iyer :—Trial of ragi varieties. Cost of cultivation and crop cutting experiments with ragi. Cocoanut cultivation. Cost of cultivation and yield of vegetables near Bangalore, manuring of arecanuts.

Mr. V. K. Badami :—Cost of cultivation and crop cutting experiments of sugarcane and ragi.

At the last general meeting of the Union, a scheme for the opening up of colonies to afford facilities for students of Agricultural Institutions and members of the Agricultural Department had been drawn up by a Committee and this was explained by Mr. Yegnanarayana Iyer, the Chairman of that Committee. A lively debate took place over this scheme and after a prolonged discussion it was resolved to send up the scheme as finally amended to Director of Agriculture for the Government.

The following is the scheme as submitted to the Director of Agriculture :—

Draft Scheme for the formation of a Colony of Agriculturists trained in improved Agriculture.

Object.

The object of the scheme is to induce a number of men trained in the colleges of Agriculture to take up and develop land, in colonies.

Location.

Areas under the Marikanave, Borankanave, Krishnaraja Sagara channels and other suitable places where large areas of land may be available in compact blocks. The minimum area thus available should be 250 acres of wet land and 360 acres of dry land.

Size of Colony.

Each colony should provide for twelve holders, each of whom should be given 20 acres of wet and 30 acres of dry land.

Conditions of the grant.

(*a*) The land should be given free of cost.

(*b*) No assessment should be charged for the first five years, after which the usual rates may be levied.

(*c*) The holder should live on the land and cultivate it.

(*d*) The land should all be brought under cultivation within three years after it is taken up.

(*e*) The land should be farmed on improved lines, these being laid down by the Director of Agriculture.

(*f*) The land should not become the absolute property of the holder until after all loans to the Government shall have been discharged and until a period of twenty-five years have expired from the date of the grant of the land, when alone the holder will be free to alienate the land by sale or mortgage. The holder may however sell the land to a colonist who is entitled to the privileges of this scheme, within the period of 25 years, if he so desires. The purchaser will abide by all the conditions of this scheme until a period of twenty-five years, shall have elapsed from the date of the first grant. The price to be paid for the land in such cases shall be determined by the Director of Agriculture.

(*g*) The colonist should furnish Government a security worth Rs. 1,500.

Loans, Interest and Repayment.

A loan up to a maximum of Rs. 6,000 may be given to each holder. The rate of interest should be 5%. The amount should be advanced only in instalments not exceeding Rs. 1,000, the exact sum depending upon the value of the work executed, as may be certified by the Director of Agriculture.

No loan under these rules will be given after the expiry of the three years which is the period fixed for bringing the land under cultivation. The full loan should be repaid within twenty years from the date on which the last instalment may have been advanced.

Roads.

The whole area of the colony should be surveyed, blocks of 20 acres of wet and 30 acres of dry land marked out, and a road connecting the colony with a convenient point on high road, made at the cost of Government.

Houses.

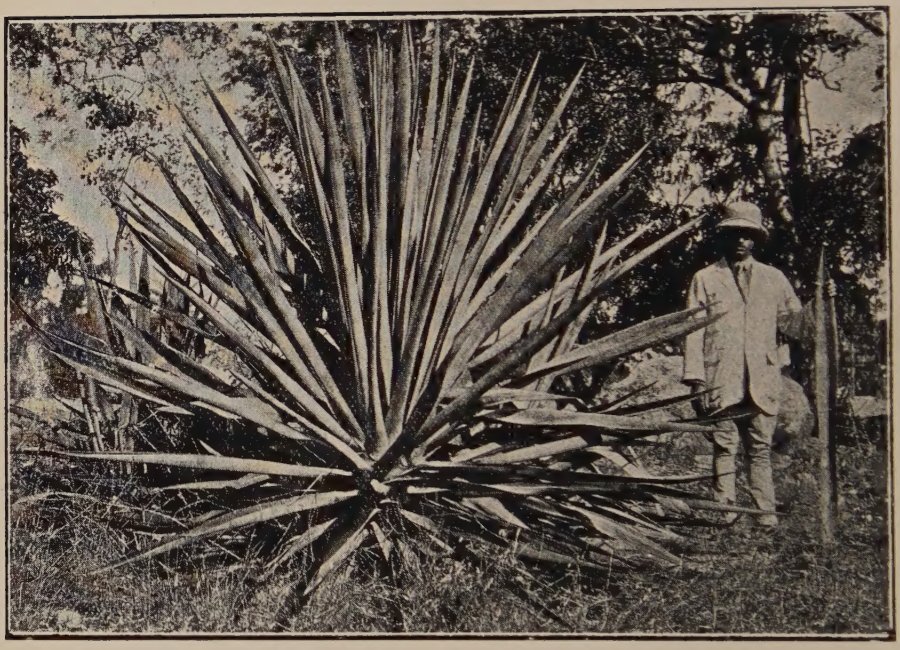
The colonist shall build his house in his own holding. The location, the size, and pattern of the house and its appurtenances such as cattle stall, manure pits, farm yard, etc., shall be generally as may be prescribed by the Director of Agriculture.

Penalty for Default.

The land including buildings will be liable to be resumed by Government if any of the conditions of the scheme are infringed in spirit or letter.

Qualifications of Colonists.

No one shall be entitled to the benefit of this scheme, except (1) members of the staff of any of the Departments of Agriculture; (2) those who have undergone a full course of training in any recognised Agricultural Institution.



SISAL HEMP GROWN ON STONY SOIL, LAL-BAGH, BANGALORE.

See page 91.